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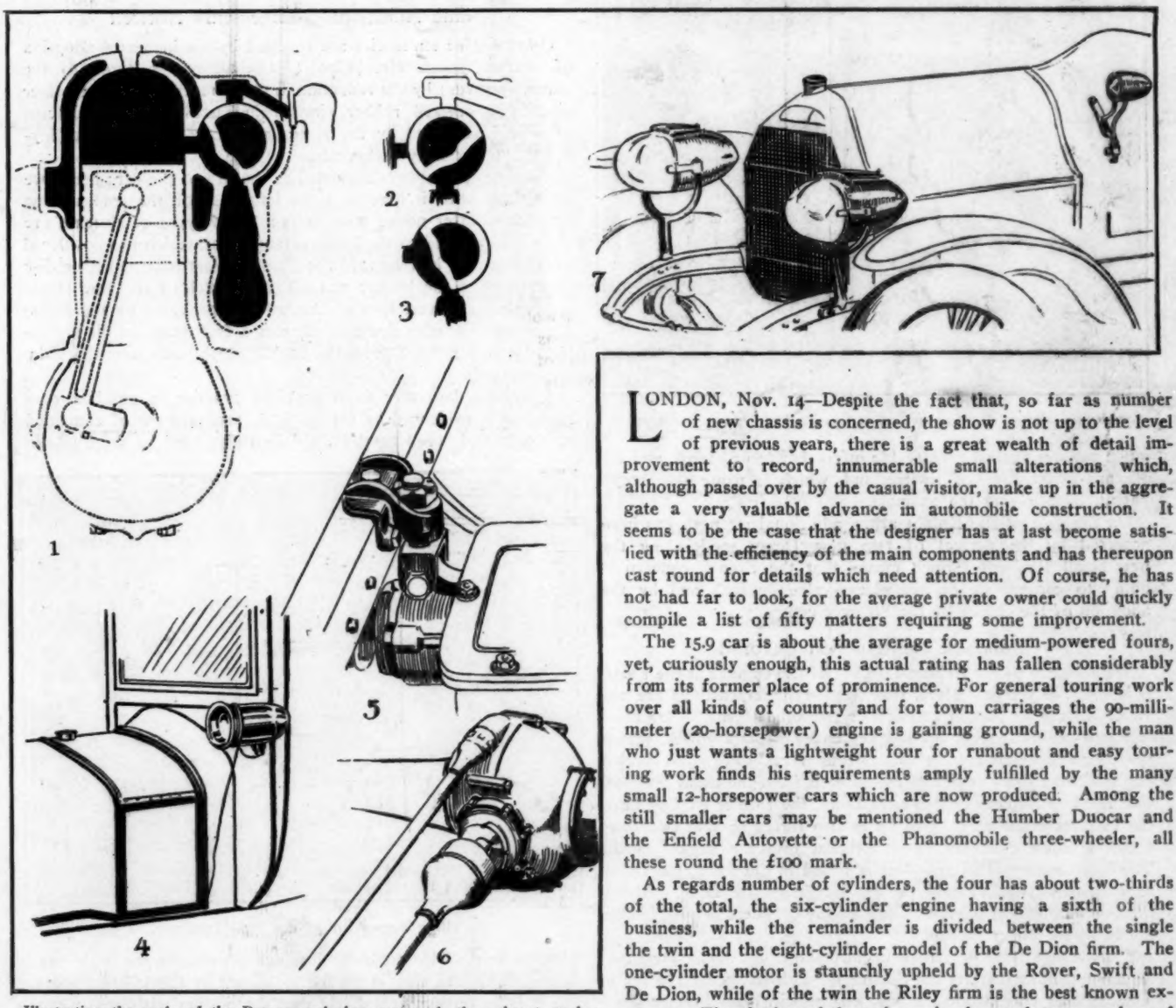
THE AUTOMOBILE

Technical Notes on Olympia Show



Illustrating the cycle of the Darracq valveless motor—1, the exhaust stroke; 2, at the end of the suction stroke; 3, the compression stroke

4—The new limousine of the Sizaire-Naudin has inside control and novel disposition of the gasoline tank in front of the dash

5—Showing an ingenious method of supporting the gearset on the cross-member of the frame, as adopted in the Sunbeam

6—Detail of the rear suspension of the Delahaye car which shows new position of torsion bar

7—Some novelties in the shape and arrangement of the head and sidelights seen on the new Daimler

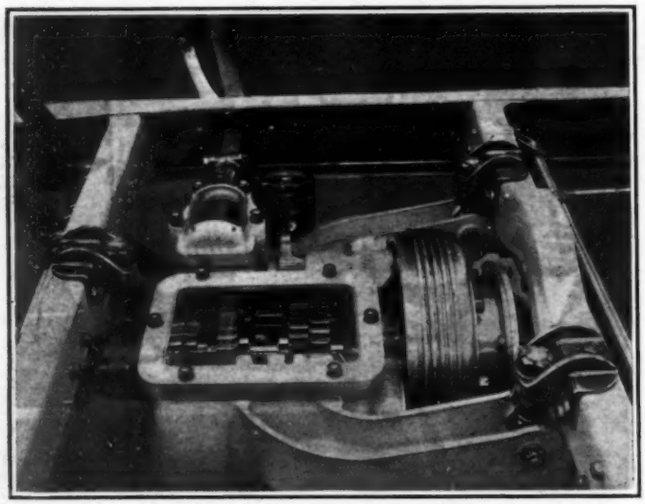
LONDON, Nov. 14—Despite the fact that, so far as number of new chassis is concerned, the show is not up to the level of previous years, there is a great wealth of detail improvement to record, innumerable small alterations which, although passed over by the casual visitor, make up in the aggregate a very valuable advance in automobile construction. It seems to be the case that the designer has at last become satisfied with the efficiency of the main components and has thereupon cast round for details which need attention. Of course, he has not had far to look, for the average private owner could quickly compile a list of fifty matters requiring some improvement.

The 15.9 car is about the average for medium-powered fours, yet, curiously enough, this actual rating has fallen considerably from its former place of prominence. For general touring work over all kinds of country and for town carriages the 90-millimeter (20-horsepower) engine is gaining ground, while the man who just wants a lightweight four for runabout and easy touring work finds his requirements amply fulfilled by the many small 12-horsepower cars which are now produced. Among the still smaller cars may be mentioned the Humber Duocar and the Enfield Autovette or the Phanomobile three-wheeler, all these round the £100 mark.

As regards number of cylinders, the four has about two-thirds of the total, the six-cylinder engine having a sixth of the business, while the remainder is divided between the single the twin and the eight-cylinder model of the De Dion firm. The one-cylinder motor is staunchly upheld by the Rover, Swift and De Dion, while of the twin the Riley firm is the best known exponent. The single and the twin engine has each its own class of followers, and one cannot forsee the likelihood of either type going out of fashion.

The valve controversy has broken out more fiercely than ever; in fact, the situation is almost as exciting as when, in 1908, the Knight engine was presented to the British public by the Daimler company. The two intervening exhibitions have seen no further

complication of the issue, though, of course, new licensees of the sleeve-valve engine have made their bow each year. But now the whole of the industry seems likely to be drawn into the struggle, for new claimants for public favor are to be found in the Argyll firm, with its single-sleeve engine; in the Darracq rotary valve motor and in the piston valve design of the Itala concern. And, meanwhile, we have the Crowdy piston valve engine as another competitor. Incidentally, it is announced that Messrs. Knight and Holbourne, after inspecting the new Argyll sleeve-valve engine and taking advice about the patents, deem the Argyll company to be infringing the Knight patents. This news has astonished the motor trade in Great Britain, because it suggests that Mr. Knight must be claiming a master patent over moving cylinder walls. But for that basic resemblance the Argyll and Knight motors seem quite distinct. Meantime the Argyll company is indemnifying all purchasers of its single-sleeve



Sunbeam gearset, showing method of attaching to frame cross member

valve engines against penalty for infringement of patent, and the Piccard-Pictet firm, of Switzerland, which is using the Argyll patent, is following the example.

On the side of the Knight army, additional strength has been acquired by the arrival of two new Deasy models, by the new small Panhard (which means that the French concern is going to concentrate on the sleeve-valve engine) and by the adoption of the engine by the Stoewer company.

Monobloc Construction Favored

With regard to the technical details of the engines at the show, it is clear, in the first place, that single-cylinder castings are not favored, save by Austin and one or two other firms. Parr castings are general except for engines under 15 horsepower, where the monobloc construction is a strong rival. For six-cylinder engines two pairs of three cylinders each form the usual practice. Daimler and Napier are two exceptions; the former engines have the exhaust branches coupled up in two threes so that two consecutive firing cylinders never exhaust into the same branch. The V arrangement of cylinders is found in the Riley, the Delahaye (a six-cylinder) and the eight-cylinder De Dion. About the only example of desaxé placing of the cylinders is afforded by the two new Rover models.

The average ratio of stroke to bore shows a distinct increase. As the top limit there is the Sizaire 15, with stroke of 170 for a 70-millimeter bore, while the only engine with bore greater than stroke is to be found on the N. E. C. stand. The two Lanchester models, four and six cylinders, have equal bore and stroke of 4 inches, and the Opel 12 supplies a case of the stroke being shortened this year from 120 to 100 millimeters; otherwise the tendency is toward bigger crankshaft throws. Examples of long-stroke engines are the Sunbeam, 90 by 160, and the La Buire, 80 by 160.

Chain-driven crankshafts are all the rage. For this, at least, one must credit the Knight-Daimler engines. Probably over two-thirds of all the engines in the show are thus equipped. Of the others the Spyker and the Fiat 15 horsepower have worm-driven shafts. Overhead camshafts are employed in the engines of the Maudslay and Germain firms, though rumor has it that the latter engines will soon be valveless.

The above practice has silence of running as its object; smoothness of running is now better insured by the balancing of flywheels—a patent, but generally unsuspected, cause of vibration. As for the periodic vibration of crankshafts, the previous existence of this trouble is evident from the importance of the firms which now employ vibration dampers. Rolls-Royce, Daimler and Deasy are three examples.

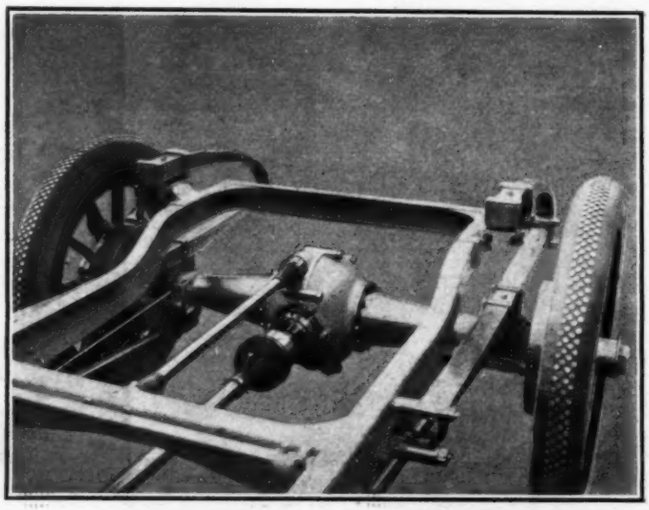
Ignition shows improvement in regard to the use of self-advancing magnetos, while a novelty which looks like having a future before it is the Simms arrangement of combined ignition and lighting dynamo. A similar dual service is rendered by the Ford flywheel magneto.

Some Additional Refinements Noticed

Other engine tendencies are revealed by the increased adoption of thermo-syphon circulation (Vauxhall has reverted to the pump, however) by the reduction in the number of external water pipes (compressed rubber rings being used between adjacent cylinder cases) and by the remarkable increase in the employment of proprietary carbureters.

The engine is always regarded as the life of the car; hence we have dealt with it here at some length. For the transmission details a shorter notice must suffice. New types of clutches are to be seen in the Vauxhall disc arrangement, which has powdered graphite as the lubricant, in the Panhard cast iron and fiber disc clutch, and in the leather and oil cone clutch of the new Humber models. A variation of the latter is provided by the Rolls-Royce and Crossley designs, wherein a few drops of oil are injected into the clutch from the engine supply each time the pedal is depressed.

A radical departure from previous practice in gearbox construction is evidenced by the B. S. A. arrangement of combined rear axle and speed gearbox, a design also used by the Sheffield



Rear suspension of the 1912 Delahaye

Simplex firm. This method offers distinct advantages in the way of simplicity and also in regard to silence of the indirect gears, and it is by no means unlikely that the custom will have a considerable vogue in the future. In gearboxes of the standard type the layshaft is often placed below the main shaft, particularly in those boxes designed for the use of oil as the lubricant. The Maudslay chain-driven gear box is an example of a novel but highly satisfactory design, while epicyclic gearing is still retained by Lanchester. All Talbot gear boxes have a sprag device, a once universal fitting.

Despite the announcement by a few firms (notably Sunbeam

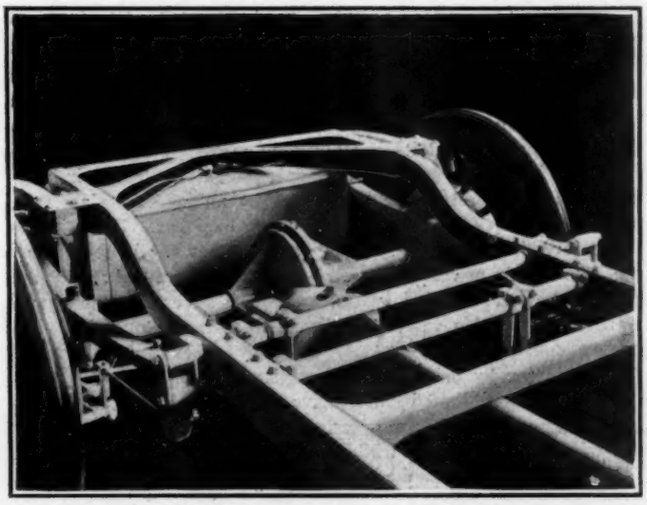
and Crowdy) that they intended to abandon worm gearing for bevel, the former method of rear axle drive increases in popularity, Minerva and the Humber being two prominent accessions to the now lengthy list. In the Thorneycroft, Star and Straker Squire lists one worm-driven model (for closed carriages) is included. The Armstrong Whitworth rear axle has spiral gear drive, while another novelty in this chassis component is found in the direct drive on the third and fourth speed provided on the 15-horsepower Lancia car.

It seems clear that eventually both brake sets will be placed at the road wheels. Front wheel braking is hardly popular as yet, but this practice will certainly come into general favor before long. Meantime many makers are placing both brake sets at the rear hubs, some, like Panhard's, favoring the expanding type for both, while others resemble the B. S. A. in the use of a double set of outside bands. A dozen cars have a combination of the two forms. Raybestos, or some similar lining, is becoming general, and hand adjustment may be described as almost essential. A point for criticism is the complication of the equalizing arrangements for the rear brakes; the Vauxhall suggests itself as a simple yet effective method.

Unit Construction with Three-Point Suspension

Great attention seems to have been paid to the springing. Not a few firms, such as Arrol-Johnson, Austin, Panhard, employ elliptics at the rear, while three-quarter elliptics are to be seen everywhere. Lever or other special suspension methods are common; three or four firms (Deasy and Rolls-Royce in the list) use the Lanchester type.

Adjustable steering columns and pedals indicate increased attention to the drivers' convenience, while the several additional cars fitted with engine starters show how this desirable accessory is gaining ground. Two other cars (Armstrong Whitworth and Piccard Pictet) are provided with mechanical tire pumps—useful fittings, yet doubly so are the engine-starting apparatus also supplied. A number of makes are equipped with an electric light dynamo as part of the standard equipment—the Armstrong Whitworth's and the Daimler sixes suggest themselves. Going further than this, a dozen firms supply top, screen and head

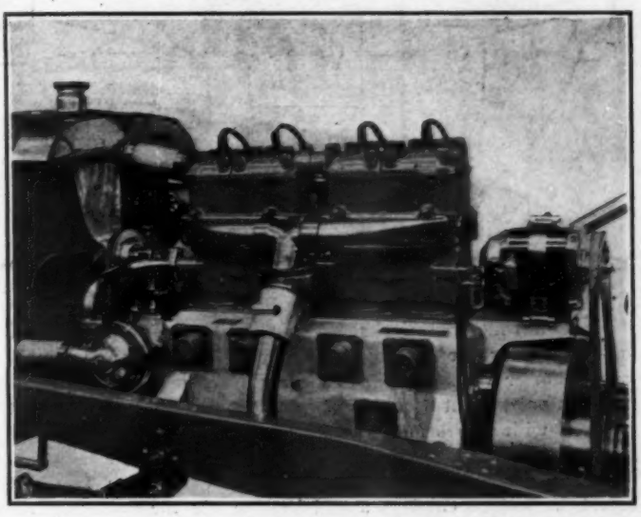


Rear suspension of the 1912 Lancia

lamps with their cars; by next Olympia we shall have arrived at that satisfactory state of affairs when every car is sold fully equipped and ready for full use, without any charge for extras.

Unit construction of motor, clutch and gearbox has been made a conspicuous feature on European cars for 1912. It is difficult to understand, in many cases, why the change has been made, for it has not tended toward accessibility, and to dismount any one of the three parts forming the unit is generally a workshop job. Three-point suspension usually goes hand in hand with unit construction, though there is really no general rule, some makers adopting the unit type to give additional rigidity to the frame, and others to gain greater flexibility. In the former case the entire unit is bolted to the frame members, while in the latter the attachment is at three points only. It should be pointed out that this unit type of construction is being found to tend towards increased noise, a droning being set up when running fast, and this naturally being accentuated when running on one of the gears. So much importance is attached to silent operation that this tendency to hum may be a serious objection.

Panhard has set the fashion by producing the new 1912 model with the 15-horsepower Knight motor on the unit system with three-point suspension. Hangers to left and right of the motor base attach to the frame members, and the rear of the gearbox is bolted to a transverse frame member, the clutch housing and gearbox coming under the footboards in a manner which, externally at least, recalls Ford design.



Carbureter side of Delaunay-Belleville motor

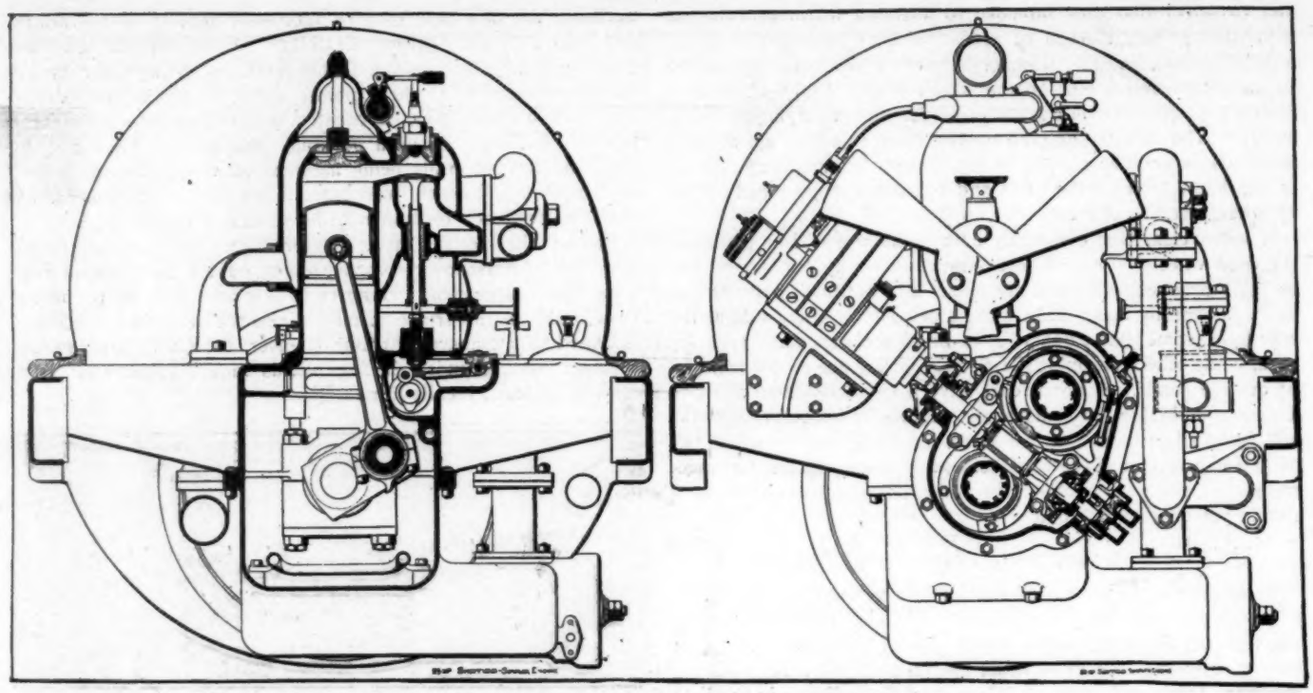
Another important example is to be found on the De Dion Bouton models. The existing types have not been changed, but where new models have been produced unit construction and three-point suspension have been adopted. There are two of these, both very small, low-powered cars intended for work as light runabouts. Hangers on the crankchamber attach the motor to the side members, and the rear of the gearbox is hung to a tubular cross member.

Fiat Offers Interesting Unit Design

A most interesting construction is to be found on a small Fiat car. The base of the crankchamber is in one casting with the complete gearbox. The base chamber itself adheres to standard lines of design, but instead of terminating at the rear with the upper portion of the crank chamber, it is flared out to form a skeleton around the flywheel and terminates in a complete gearbox. The upper portion of the crank chamber is quite orthodox, and although the cylinders are in one block with integral intake and exhaust manifolds, there is nothing startling in the design.

Lancia has an original production of a similar nature. A four-cylinder monobloc of 100 by 130 millimeter bore and stroke has the upper portion of its crankchamber and the entire gearbox in a single casting. Four hangers allow the motor base to be attached to the crankchamber, but from the rear pair of hangers the casting is continued into the gearbox, this latter having at its rear extremity two arms by which it is in turn secured to the side frames. Thus although it is a unit construction, its design further tends to stiffen the frame.

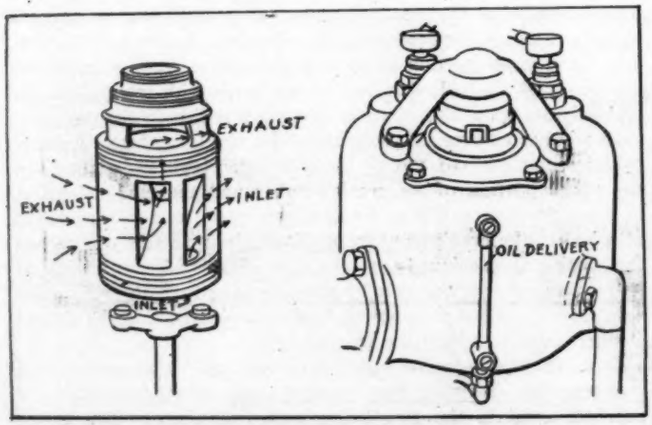
Crossley, of gas-engine fame, has a true unit construction with crankchamber forming one casting, and clutch housing and gearbox another, the two being bolted together. The entire power plant is carried on two tubular cross members, with a single point attachment at the front and two points at the rear.



Transverse section and front view of the 25-horsepower Sheffield-Simplex motor

Three-bearing crankshafts for small motors—4-inch bore or less—is by far the most common method of construction. A large number of firms, indeed, carry their mainshaft on two bearings only, but it should be pointed out that several who were satisfied with two bearings last year have gone back to three bearings. The small Fiat, of 80 by 130 mm. bore and stroke, and the small Lancia have their crankshafts carried on two ball bearings. Delage employs a ball bearing for the center of the crankshaft of his six-cylinder motor, but has anti-friction for his two end bearings. The same maker has used five ball bearings for the crankshaft of his fast runabout. However, on his standard four-cylinder models this maker uses two bearing shafts. As a general rule the English makers are not in favor of two- or three-bearing crankshafts for respectively four- and six-cylinder motors. Thus, both Crossley and Sunbeam employ five bearings for the four-cylinder motors, and Sunbeam has seven bearings for the six-cylinder monobloc.

A silent chain in place of meshing pinions is very extensively employed on cars of both English and Continental construction It is now used, for poppet valve motors, by Crossley, Sunbeam, Unic, Sizaire, Clement-Bayard, Chenard-Walker, Gregoire, Vauxhall, as well as by many others who adopted it a year ago. With the spread of monobloc casting for motors of larger and larger size, there have been made improvements in the simplification of water, intake and exhaust piping. Lancia, Fiat and S. P. A., three of the leading Italian makes, are conspicuous in this respect by reason of intake and exhaust manifolds cast with the cylinders, and all piping abolished. In these cases the carbureter is bolted up direct to the intake manifold, the throttle being within the cylinder casting. On the Piccard-Pictet models there are separate exhaust manifolds for the two groups of cylinders, but the inner extremity of each passes into a common descending exhaust pipe.



External view of Itala distributor valve and of the valve chamber

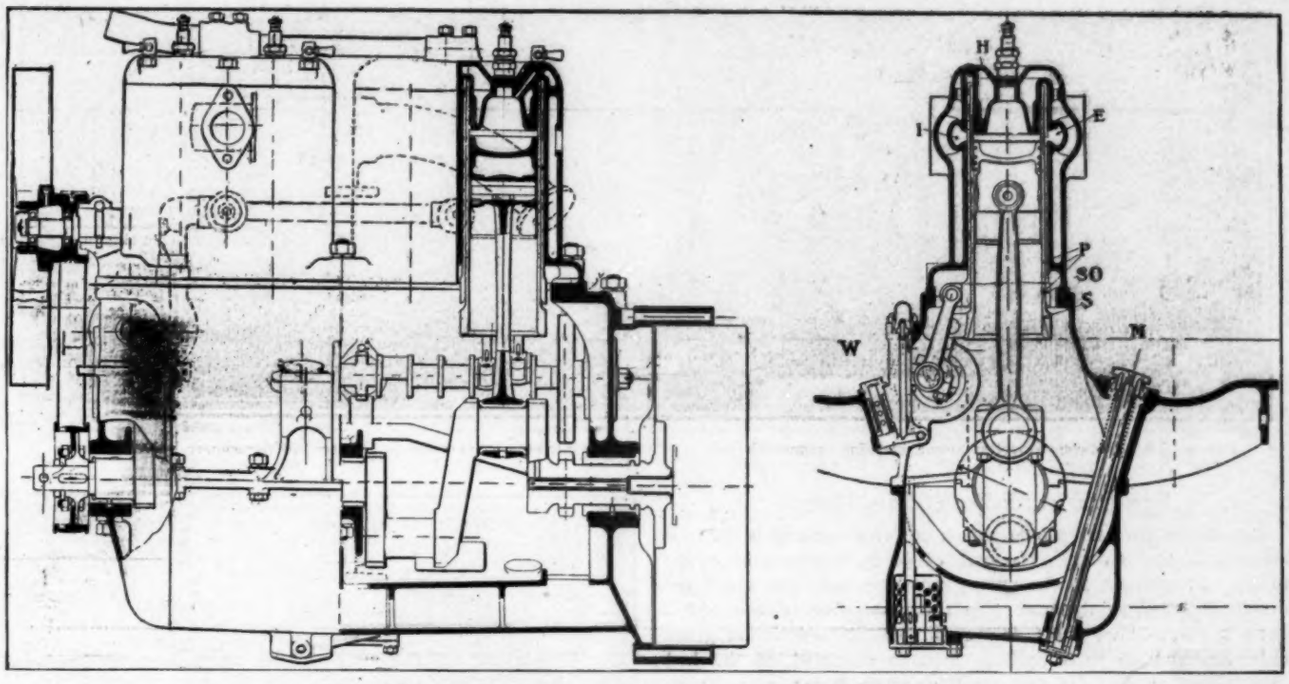
Many Chain-Driven Cam and Magneto Shafts

Crossley, the Manchester builder, has stuck to the five-bearing crankshaft. Separate chains are used for camshaft and magneto shaft, the magneto being mounted on a bracket cast on the crank chamber and having a sliding bush so that the magneto and its shaft can be moved laterally. Lubrication is forced throughout, the arrangement made for indicating the level of oil in the base being by an inclined glass tube on the outside of the base of the crank chamber. Provision is made for lubricating the spigot end of the shaft. At the end of the crankshaft a valve closes the oil way bored through the shaft; when the clutch is withdrawn—it is inverted cone type—a trigger opens this valve and allows oil to flow along the spiral groove cut on the spigot. As in many other cases, Crossley drives his fan by belt from the magneto shaft.

Wolseley has adopted chain drive for the camshaft and magneto and pump shafts. Three-point suspension has been made use of for the gearbox, while the mud pan has been abolished.

Panhard's novelty is the new Knight motor of 80 by 130 mm. bore and stroke with three-point suspension, the crank chamber being attached by the two side arms, and the gear box being bolted at the rear to a transverse frame member. Three plain bearings are used for the crankshaft, with pressure feed lubrication to the main bearings and through the bored shaft to the connecting rod ends.

Delaunay-Belleville changes comprise the inclining of the valves in order to diminish the size of the combustion chamber. This has been done on all the models but a small four cylinder car. Gate change has had to be adopted to meet the requirements of the British market. An interesting feature is the new carbureter, which really consists of two carbureters combined,



Side and transverse sectional views of the 15-horsepower Panhard-Knight motor

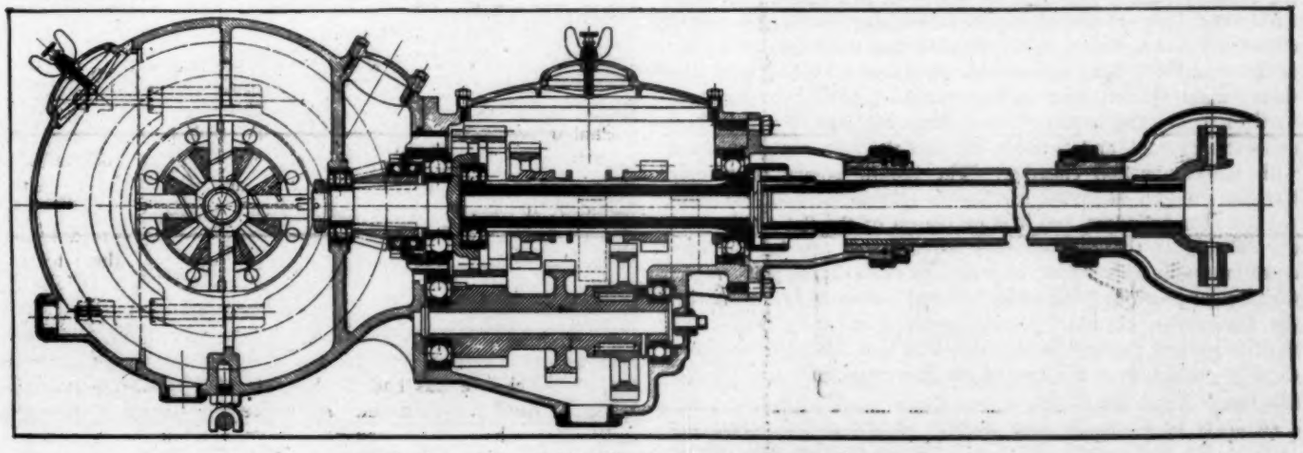
one being an ordinary single jet type with variable primary intake and additional air through a glycerine dashpot, and the other a surface carbureter, with the same level maintained as in the float chamber, and used for slow running and starting.

The Rotary Valve Itala Motor

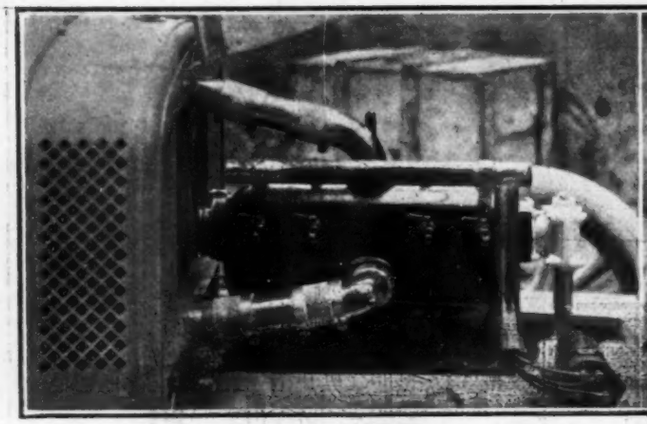
An examination of the new valve gear introduced by the Itala Company, one of the famous Turin firms, shows the rotary valve therein adopted as something quite different from any of the other few types of rotary valves on the market. Only the 35 horsepower chassis has been fitted with this new device. The engine has four vertical cylinders, which are cast in pairs. The bore of the cylinders is 105 mm and the stroke 150 mm. The ordinary four inlet and exhaust valve spaces in the poppet valve type of engine are replaced by two spaces, each containing a rotating valve that carries out the functions of distribution.

This rotating valve is of the simple design and is connected by a vertical rod to one shaft that takes the place of the two camshafts. The function of this shaft is to drive the magneto and water pump, and to rotate the valves. This is done by means of an endless screw of the same type as the well-known Itala device, which for years has proved so efficient for driving the firing cams of the low tension ignition.

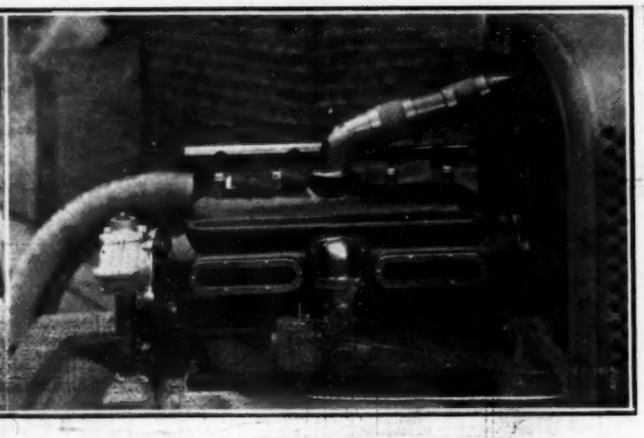
Each rotating valve exercises the same functions as two inlet and two exhaust valves. The ordinary water and oil circulations for cooling and lubricating the engine are extended to the rotary valve; and when it is remembered that the valve rotates only once to four revolutions of the engine, it can be seen that the chances of seizing are eliminated. Should, however, seizing take place through the unlikely event of both cooling and lubricating systems not functioning properly, a wedge inserted in the vertical rod which rotates the valve would act as a safety valve and sever the connection, and thus prevent any damage to the engine. In order to insure regular and even functioning of the rotary valve there are two compensating chambers in the wall of the valve cylinder so that all pressure on the rotary valve by the explosions is obviated. By the system of intake and exhaust, the only alternating moving parts in the whole engine are the pistons, and consequently this type of engine can be constructed to run at high speeds without provoking vibrations. As the rotating valve, which is on one side of the cylinders, rotates almost in contact with the combustion chamber (which is made perfectly semi-spherical), and there is no valve space on the other side of the cylinders, the efficiency of the engine in the production of power from a given cylinder volume has been found to be increased by about 30 per cent.



Longitudinal section Sheffield-Simplex 3-speed gearbox and rear axle



Darracq 20-horsepower valveless motor, showing magneto leads



Distributor valve side of Darracq 20-horsepower valveless motor

Few Cars, with Power Tire Pumps

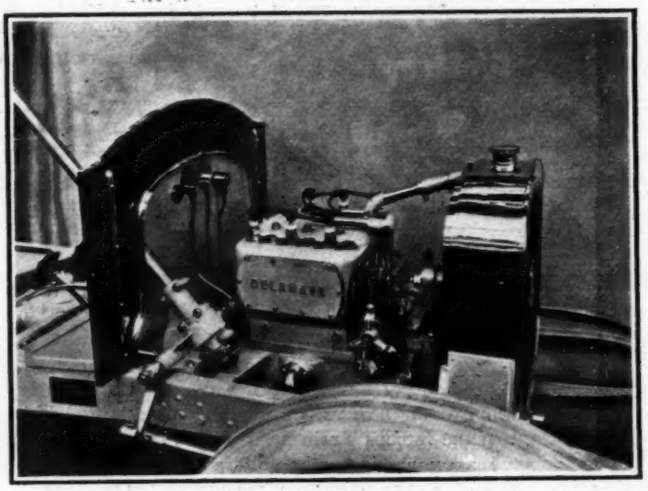
One of the few cars shown with a power tire pump is the new six-cylinder Armstrong-Whitworth of 90 by 135 mm. bore and stroke. In addition to the pump, provision has been made for electric lighting by dynamo. On the valve side of the motor there is an auxiliary shaft driven off the enclosed timing gears and connected up to a lighting dynamo mounted on the bed plate of the motor. On this auxiliary shaft is carried a pinion transmitting power to a parallel shaft operating an air-cooled cylinder for pumping tires, there being a sliding pinion on the pump shaft which can be brought into engagement with the fixed pinion on the dynamo shaft.

Scat, Piccard-Pictet, and Adams are the only other firms fitting a tire power pump. The Piccard-Pictet case is particularly neat, the pump being a single vertical cylinder bolted to the top of the gearbox cover and having its piston worked off one of the constant meshing pinions. This pump has been employed for a couple of years on both the Piccard-Pictet and the Hispana-Suiza cars. Piccard-Pictet also shows a new rear axle in a one-piece forging, having very much in common with the axle shown by Renault a year ago. It is a one-piece production with the ends bored out to receive the drive shafts and the center forming a cradle for the differential, the front being closed by a steel plate, and the rear by an aluminum cover. A convenient fitting is a combined ignition switch and petrol cock on the dashboard. The gasoline is under pressure, the feed pipe passing across the front of the dash and the cock connected to the switch, so that when the ignition is off the gasoline flow is closed.

Side Lights on the Henriot Motor

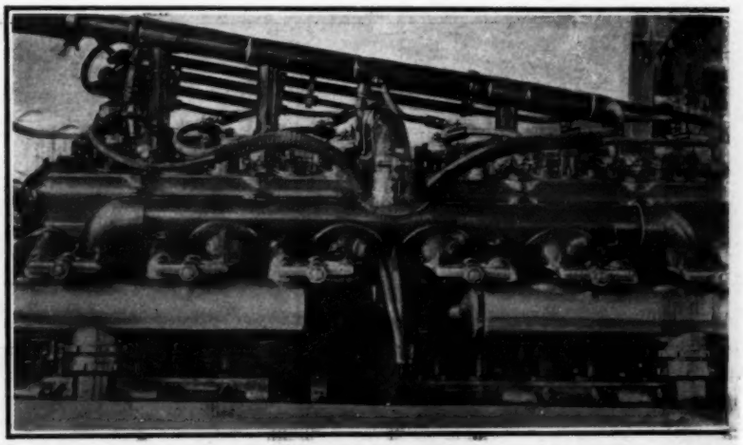
The Henriot rotary valve motor has four cylinders of 95 by 140 mm (3.7 by 5.5-inch) bore and stroke. On one side of the cylinder casting and near the head—in this case on the left-hand side—is a cylindrical chamber receiving the hollow rotary distributor. The rotary valve chamber has three sets of ports: in the head the intake ports giving communication with the intake manifold surrounding the chamber; below, in the same vertical plane, the exhaust ports admitting into the bolted-on exhaust manifold, and between the two the port communicating with the combustion chamber. The hollow rotary distributor has four roughly D-shaped sections to correspond with the ports for the four cylinders, and it is by reason of the flat portions of the roller that the opening into the cylinder can be put into communication with either the intake or the exhaust ports, while the circular portion of the roller shuts off all communication with the combustion chamber during compression and firing. The most important feature of this motor is that the ports are covered by the piston at the end of the compression and at the beginning of the firing strokes.

In order to allow the easy passage of the piston across the face of the ports, these latter are two in number and oblong shaped, the greatest dimension being in the direction of travel of the piston. The two ports in the distributor chamber are also oblong shaped, but with the greatest dimension in the opposite direction—from front to rear.

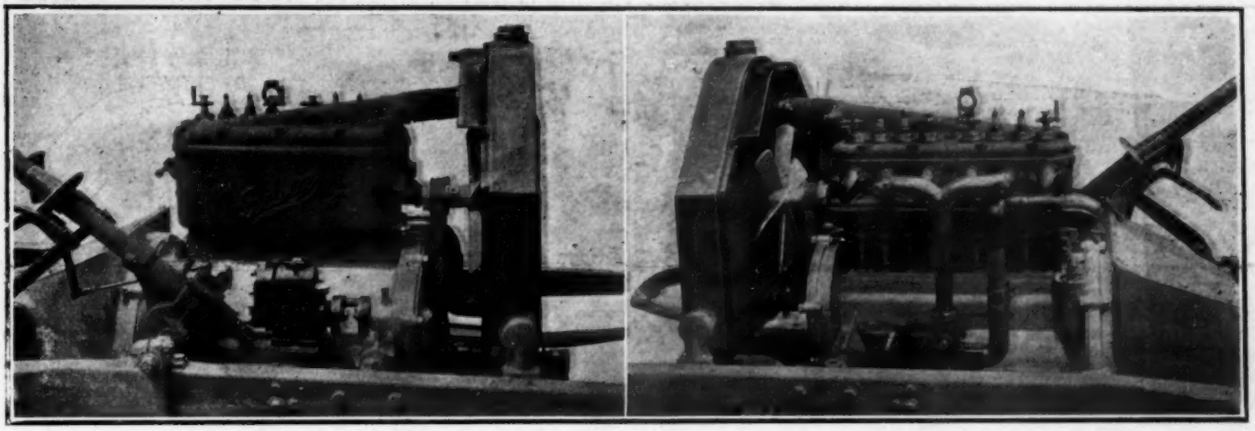


Delahaye six-cylinder monobloc V-type engine

The motor is a bloc casting with the intake manifold cast with the cylinders, and with the distributor water-jacketed. Water circulation is by thermo-syphon with the inlet pipe connected up to the right-hand side of the motor and the outlet from the top of the casing to the dashboard radiator. The crankshaft is carried on three plain bearings, and the crankchamber is divided

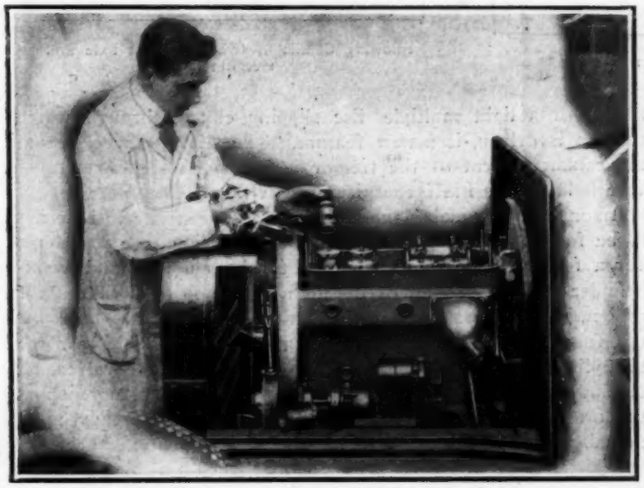


Left side of Rolls-Royce engine



Magneto side of Belsize 10-12 motor

Valve side of Belsize 10-12 motor

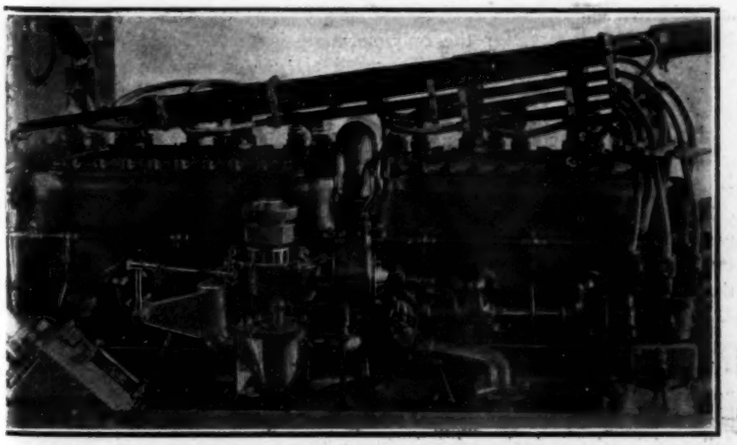


Showing easy removal of valves of Germain motor

into two chambers to secure the correct level of oil in each for splash lubrication. The lubricator is mounted high up on the dash and driven by belt from the rear of the distributor. What is generally known as the Renault type of bonnet has been adopted, but combined with it is a 10-gallon gasoline tank, and in the center of the dash the belt-driven mechanical lubricator already mentioned. There is no fan, and no vanes on the flywheel.

Innovations of the Rolls-Royce

Rolls-Royce, Ltd., exhibited three complete cars which, so far as their outward appearance was concerned, showed no change from last year's models. A number of detailed improvements have been effected, however. Carburetion has been given special attention in the new models, and the flywheel and timing gears are so connected to their shafts that any slight vibration at certain motor speeds has been eliminated. Because no chassis was shown, it was impossible to get any detailed information as to the improvements which have been effected.



Right side of Rolls-Royce engine

The 40-50-horsepower model has six cylinders, cast in blocks of three. The valves are all on one side and are operated by rocking levers. The motor, which has a seven-bearing crankshaft, is specially suspended by links. There appears to be little change in the design and arrangement of the power plant, though several refinements are evidenced. The three-speed drive is retained, which is contrary to the adoption by some of the other prominent makers of the four-speed type. One important innovation for 1912 is the adoption of a spherically ended torque tube which encloses the propeller shaft. The frame has been made more rigid also, by the addition of tubular cross-members throughout, with the exception of the rear tie-rod, which is of U-section.

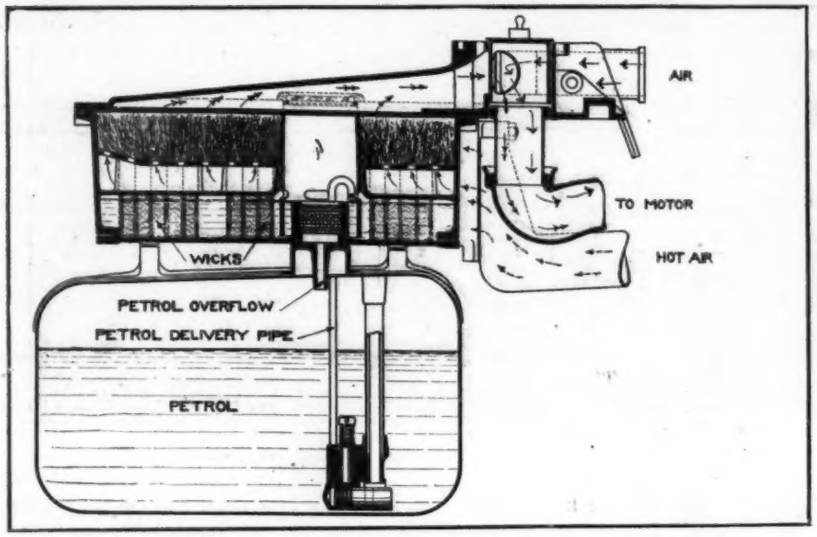
Lancia Abandons Fan Belt-Drive

On a small four-cylinder monobloc Lancia, the designer has got away from the use of belt drive for the fan by fitting a water turbine within the fore end of the water jacket. The car being a new one, only just received from the factory, no detailed information could be furnished even by the agent; the external appearance, however, was remarkably neat, there being nothing outside to show how the fan was driven. Lubrication is under pressure to the two ball bearings in which the crankshaft is carried, and to the connecting rod ends, but no pump was visible; it was declared that the half time pinion acted as oil pump, but how the agent was unable or unwilling to say. On this car the four-speed gearbox is now carried on the rear axle, with all the gear shifting mechanism—selective type—passing inside the torque tube. The bigger car, four cylinders of 100 by 130 mm., was orthodox in the position of its gearbox, but original by being a one-piece casting with the motor base, two arms at the extreme rear of the box attaching it to the frame members.

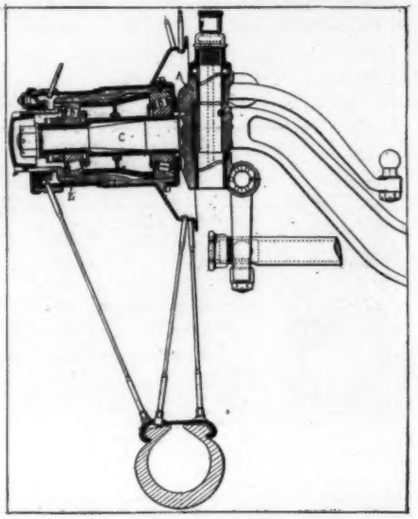
To facilitate brake adjustment the Vulcan cars had an extension from the winged nut regulating the external shoes of the transmission brake, up to the side member of the frame; instead of having to stoop under the chassis to regulate these shoes, the work could be done from the side of the car.

Lanchester Cars Present Novel Features

Despite the fact that conservative design finds favor among English engineers, there is one British car which stands out distinctively—the Lanchester. There are many novel features possessed by the Lanchester—such as the wick carbureter, the



Wick carbureter, one of the novel features of the 1912 Lanchester line



Showing details of Crossley front axle and steering knuckle

epicyclic gearing and principally in the absence of a front bonnet.

In 1912, two types of Lanchester cars will be constructed, the 25 four and the 38 six, both having pair-cast cylinders of 4-inch bore and stroke. This is about the only case of a "square" European engine; the 1912 average will be somewhere about a 1.6 ratio of stroke to bore.

Prominent features of the Lanchester motor are the horizontally placed valves in the heads, these valves being kept on their seatings by flat springs. On the "four," thermo-syphon cooling is quite satisfactory; the bigger six calls for a pump. High tension dual magneto and high pressure (30 pounds square inch) lubrication are employed. The main fuel tank forms one of the cross-members of the frame; from here the liquid is pumped up by the engine to the wick chamber, through which the inrushing air is passed. Extra air is provided through an automatic valve, and the outfit is complete, save for an adjustment left to the driver to compensate for weather variations. By the fact that the supply of fuel pumped up to the wick-chamber varies directly with the engine speed, the strength of the mixture is always approximately constant.

The transmission system comprises a multiple disc clutch and three-speed epicyclic gearbox, the gear changes here being made by means of disc clutches, with a positive lock for the high. In the gearbox there is a force pump which supplies oil under pressure to all the bearings. Final transmission is by worm gearing, with the worm below the center.

The rear suspension is another novel point. Two long flat springs are attached to the frame sides and their rear ends are free to slide in block brackets on the axle casing. An arrangement of parallel and jointed radius rods keeps the axle in place.

Some Daimler Refinements of Detail

While Daimler, of Coventry, has made no great change in the Knight-engined models, there are a few interesting detail improvements. On the six-cylinder models provision is made for receiving a dynamo for electric lighting purposes. It is evident that this matter will receive more and more attention from car manufacturers, for the numerous electric lighting systems now on the market are meeting with a considerable amount of favor, but the great difficulty is that they cannot be neatly and conveniently fitted when produced as an afterthought. A change over has been made in the positions of the sliding and universal joints, the sliding joint now being at the rear of the propeller shaft, instead of at the fore end. Among the few changes in the motor is the attachment of the sliding oil troughs to the upper portion of the crank chamber, the lower portion thus acting as an oil retainer only. A patented vibration damper, consisting of a light multiple disc slipping clutch, through which the fan is driven, is a new feature. The slip on the clutch at the commencement of the tremor is sufficient to rectify it before it has made itself conspicuously felt.

Among English makes the highest ratios of stroke to bore are to be found on Sunbeam cars, where dimensions are 80 by 150 for a four-cylinder, and 90 by 160 for both a four and a six-cylinder model. In view of the high reputation of Sunbeam for design, it is interesting to note that five bearings are used for the four-cylinder monobloc motor and seven bearings for the six-cylinder with its cylinders in two castings. The valves, all on one side, have their stems inclined with a view to reducing the area of the combustion chamber. This, as already mentioned, has also been adopted by Delaunay-Belleville. Webs between the hangers and at the front of the motor completely fill up the space between motor and frame.

Unit Construction Used in La Buire Cars

The novelty of the La Buire construction is the fitting of a foot and lever operated brake on an extension of the propeller shaft at the back of the axle. This firm has also made use of unit construction for all models and has some of the largest monobloc castings to be found in the show, a six-cylinder being 85 by 140 mm., and the biggest fours in one bloc being 90 by 160 and 105 by 150 mm. respectively. There is a special coupling on the tail shaft of these models, allowing them to be quickly disconnected from the propeller shaft, enabling the multiple disc clutch to be withdrawn in a single unit.

Self-starters do not appear to have been very seriously tackled by European makers, for the only new one is to be found on the Alldays car. It consists of a small air compressor driven by gearing from the chain-driven camshaft and compressing air into a tank. The compressed air is used to drive an oscillating pneumatic motor connected up by worm gearing to the clutch shaft, with an arrangement by which the clutch shaft can overrun the shaft of the pneumatic motor. Compressed air and other types of self starters were brought out in Europe four years ago, but owing to their complications never really caught on. Where they are most desired is on small cars driven by their owners, and it is here that complication is least needed.

Vauxhall Typical British Poppet Valve Car

Two types of the Vauxhall car are made, the 20 and 30 horsepower, with four- and six-cylinder engines respectively. The casting of the 30-horsepower cylinders in threes is the method followed by the majority of British constructors. No case exists of the use of single-cylinder units for a six. The bore and

stroke dimensions are 90 mm and 120 mm respectively, this ratio being somewhat less than the average. Special pains have been taken to secure minimum weight for the reciprocating parts. The sides of the cast-iron piston are drilled out, while the connecting rods are drilled away till the finished article looks quite fragile, but no case is reported of failure at this point. The result of the weight-cutting is apparent in the increased speed of rotation—very little vibration being observable at high speeds.

It will be noted that the valves are all on one side and that the tappets are cased in by removable plates. All clearances in the valve mechanism are cut down, six-thousandths being the gauge limit between tappet and valve. The valve camshaft, the magneto shaft, and even the fan spindle, are all driven by means of silent chains. Thus there is no gear wheel inside the engine save the internal magneto distributor wheels.

In the transmission system, a multiple disc clutch, with 45 flat plates of phosphor bronze and mild steel, takes the power to the four-speed gearbox. In the Vauxhall the top gear is the direct drive. The gearbox is quite ordinary, shortness of the shaft being obtained by the now general practice of sliding the third speed gear inside the constant-mesh wheel to give fourth speed. The locking of the gear which is in use is made by spring plungers placed in the top of the case; the change speed lever and gate are quite free of all adornment, a noteworthy point being, however, that the transverse change-gear rod is provided with a double universal joint to compensate for any frame flexure on rough roads. The rear axle is bevel driven, rather the exception than the rule in these days of worm drive. To take up the drive a deep pressed steel girder is provided as a torque stay.

Both sets of brakes are internal expanding, the shoes being lined with copper and the drums provided with heat-dissipating flanges. The foot-operated brake is placed behind the gearbox.

As to Meeting American Competition

Very few attempts also appear to have been made by European manufacturers to meet American competition in the cheap car line. In most cases it is declared that quality will win out, and that in a couple of years the demand for American cars will have ceased. Beloize is about the only maker having seriously tackled the problem, the result being a complete two-seater with hood, windscreen and lamps selling at $1,100. The motor is a four-cylinder of 69 by 130 mm. bore and stroke with unit construction, its general design being European throughout. Another example is the B. S. A. car with a four-cylinder Knight motor. The power plant, which is 75 by 114 mm. bore and stroke has been built by the Daimler Company and has really nothing distinguishing it from other models. The chassis, produced at the Birmingham Small Arms factory, is a direct copy of a well-known American car, with the difference that the three-speed gearbox is incorporated with the rear axle, and has its gears operated on the selective principle. As a complete two-seater it is being sold at $1,550, a price which is much higher than the Beloize and greater than many American cars now on the European market.

Résumé of the Prospects for 1912

The British Industry has the immense advantage of being united in a self-governing body—the Society of Motor Manufacturers and Traders—and therefore, it is a simple matter for a generally expressed wish to pass gradually into law. Hence, next year may see the abandonment of the system whereby cars are labeled by their year of origin.

The past year has been extremely successful on the whole. A few concerns have not found orders rise to the high water level of the previous year; in these cases, it is evident that the popular taste has not been accurately gauged. The majority of the manufacturing firms report that business has shown an appreciable and welcome advance on the last report.

The state of trade may be fairly well judged by reference to the cheap car trade. The class "below $1,600" has received very meager attention from the high-grade British maker; it would be correct to say that it has been almost entirely ignored. But it has always been clear that this section offered a very extensive field of business, in which largeness of output would compensate for smaller margin of profits; and the manufacturers have not been blind to the fact. Therefore, it has been an open secret that the leaders have designed and constructed cars which may be classed as 12 horsepower, four-cycle, four seaters at $1,200.

It is sufficiently clear, however, that these cars are not going to figure on the 1912 programs. The state of trade is taken to indicate that enough business will be available in the above $2,000 class to keep the factories running, and meanwhile the smaller man can wait another year.

This is just where the American maker will probably score. The smaller man is quite tired of waiting; the various American cars now on the British market have sufficiently well demonstrated their good points to have overcome the former inherent prejudice, and reasonable success lies clear ahead.

At present, there are a dozen American makes available for the British buyer; some, as the White, Cadillac and Ford, have been on the market for years; others, as exampled by the E-M-F. Flanders, Hudson, Brush, are of more recent introduction. Anyway, no matter what make be selected, the general reports agree that the cars have given reasonable satisfaction to their purchasers—more than this, they have proved themselves capable of better average performances than British cars of equal power but higher price. The anti-American car prejudice is now almost completely lived down. Next year should therefore prove successful to the American agencies in Great Britain.

To return to the British makers, it seems that the average power, in place of being reduced, will show an appreciable increase next year. This is due to the introduction of 20-horsepower models (with the corresponding 30-horsepower six-cylinder car) by firms which have previously concentrated on, among other types, the immensely popular 15.9 (80 millimeter bore). This car has proved highly efficient; the result has been that it is always overloaded and worked to death.

The average buyer is too unintelligent to be trusted with a light and efficient production; he keeps the engine extended to its limit all the day and wrecks it within a year. Hence the return to 20 horsepower (90 millimeter bore) for average touring and for small covered body cars. The smaller 15.9 will still be popular, but buyers will be strictly cautioned as to its limitations.

Increased attention is being paid each year to the design and quality of the coach work. The work turned out by the leading car firms is lighter in weight and better in quality than from the best of the old established coach builders, and almost all buyers now purchase the car complete. This is quite a change from a few years ago, when about half of the manufacturers' output consisted of chassis, upon which bodies were fitted by other firms.

Outstanding Features of Olympia Show

Four new sleeve or slide-valve motors; Darracq with single rotary distributor; Argyll and Piccard-Pictet with single sleeve; Itala with rotary distributer on vertical axis, one distributer operating two cylinders.

Increased use of the Knight motor.

Increase of bloc castings. Practically all four-cylinder motors up to 4 inches bore in one casting; a number of sixes in a single casting; intake and exhaust manifolds generally cast with cylinders; webs between crankcase hangers allowing mud pan to be abolished.

Unit construction of motor, clutch and gearbox, generally with three-point suspension. Where unit construction is not adopted three-point suspension is generally used for motor or gearbox or both.

Chain-driven cam and magneto shafts on a very large number of models.

Lengthening of piston stroke, the average ratio to bore on medium-sized motors being 1.63 to 1. A few as high as 2 to 1.

Speed Practice Opens for Forty-Two

SAVANNAH, GA., Nov. 20 (Special telegram)—Jay McNay, driver of a Case car, was killed to-day in the first official practice and his mechanic, M. F. Maxwell, was seriously hurt. Maxwell is now in the local hospital. Joe Dawson, driver of one of the Marmons, also lies in the hospital. He was hurt in a collision while trying to avoid hitting a touring car. The accident to McNay has saddened the practice now being held. Maxwell, his mechanic, who was able to talk this afternoon, states the reason for the accident: "Just before arriving at the cattle-park the flagman gave us the clear flag, and of course we put on more speed. Just then we saw a wagon in the road, and, as McNay swung to one side, the car skidded into a tree." McNay's chest was crushed by the steering wheel. Death was instantaneous. Maxwell has his arm broken in three places, his left side bruised and his face lacerated.

The accident to Dawson was unusual. He was riding as mechanic for Joe Nikrent and had just changed seats with him. Approaching Bethesda on Whitefield avenue the road is a little narrow and here they met a touring car. Nikrent took the side of the road with too much speed and Dawson was thrown out. He was unconscious until he arrived at the hospital.

Knipper, in a Mercer, was following close behind Dawson and Nikrent. He set his brakes and came to a sudden stop. Barnes, following in a second Mercer, failed to see Knipper when he made his sudden stop and the two went together. Both cars were badly broken up but none of the occupants was hurt.

De Palma, who made the two fastest laps in the Grand Prix in 1908, drove one lap at the rate of 75.9 miles an hour in his Mercedes. Of the smaller cars, the Mercer driven by Barnes made the fastest time—66 miles an hour. Summary:

Car	Driver	Lap time	Fastest time M.P.H.
Fiat	Bragg	15:50. 15:09.1 23:49.3	67.5
Fiat	Matson	20:17.2 36:17. 14:38.2 15:09.2 16:15.1	70
Benz	Bergdoll	15:41.3 13:47.4 13:54.1	74.8
Benz	Hearne	15:30. 13:47. 19:14.2	75
Fiat	Wagner	14:31.4	70.7
Benz	Hemery	13:48.3 15:04.	73.9
Mercedes	Wishart	16:39.3 15:10.3 33:43.3	67.2
Fiat	Parker	13:57.3 15:50.3 17:20.4 15:45.2	75.8 65.1
Pope-Hartford	Disbrow	14:07.1 15:02.1	72.3
Lozier	Grant	17:41.4 13:40.2 15:27.3	75.9
Mercedes	De Palma	33:02.4	31
Lozier	Mulford	15:25	65.8
Case	Disbrow	15:35	66
Mercer	Barnes	16:40	
Mercer	Hughes		

Jay McNay, Case; Mortimer Roberts, Abbott-Detroit; Witt, E-M-F and Evans, E-M-F, were out, but did not make complete rounds of the course from the grandstand.

Records Still Further Lowered on Second Day

SAVANNAH, GA., Nov. 21 (Special Telegram)—To-day's practice brought out more records as far as speed for one round is concerned. David Bruce-Brown, the New Yorker, who

VANDERBILT CUP—17 LAPS—291.38 MILES

Car.	Driver.	Model.	Number Cylinders.	Bore, Inches.	Stroke, Inches.	Displacement, Cubic Inches.	Horsepower.	Cylinder Type.	Lubrication	Ignition.	Clutch.
Mercer	Hughie Hughes	1912	6	4.365	5.0	448.5	45	T-head	Splash	Bosch	Disc
Lozier	Harry Grant	1912	4	5.375	6.0	544.6	46	T-head	Splash	Bosch	Disc
Lozier	Ralph Mulford	1912	4	5.375	6.0	544.6	46	T-head	Splash	Bosch	Disc
Mercedes	S. Wishart	1911	4	5.10	7.1	579.0	90	T-head	Pump	Bosch	Cone
Abbott-Detroit	L. A. Mitchell	1912	4	4.50	5.5	349.9	44	T-head	Pump	Bosch	Dry Plate
Abbott-Detroit	Carl Limberg	1912	4	4.50	5.5	349.9	44	T-head	Pump	Bosch	Dry Plate
Fiat	D. Bruce-Brown	1911	4	5.00	7.48	588.0	70	T-head	Pump	Bosch	Disc
Fiat	E. H. Parker	1911	4	5.00	7.48	588.0	70	T-head	Pump	Bosch	Disc
Fiat	Joe Matson	1911	4	5.00	7.48	588.0	70	T-head	Pump	Bosch	Disc
Jackson	Harry Cobe	1911	4	5.00	5.5	431.9	60	Valve	Splash	Splitdorf	Disc
Marmon	Joe Dawson	1911	4	4.75	7.0	496.2	36	T-head	Splash	Bosch	Disc
Marmon	Bob Burman	1911	4	4.75	7.0	496.2	36	T-head	Splash	Bosch	Disc
Mercedes	R. De Palma	1911	4	5.1	7.1	579.0	90	T-head	Pump	Bosch	Cone
Pope-Hartford	L. A. Disbrow	1912	4	5.50	6.0	570.2	50	T-head	Splash	Bosch	Cone

SAVANNAH CHALLENGE TROPHY—13 LAPS—222.82 MILES

Case	T. D. McNay	1912	4	4.38	5.0	300.7	30	L-head	Pump	Bosch	Disc
Case		1912	4	4.38	5.0	300.7	30	L-head	Pump	Splitdorf	Disc
Mercer	W. F. Barnes, Jr.	1911	4	4.38	5.0	300.7	30	T-head	Splash	Bosch	Disc
Mercer	Hughie Hughes	1911	4	4.38	5.0	300.7	30	T-head	Splash	Bosch	Disc
Mercer	Billy Knipper	1911	4	4.38	5.0	300.7	30	T-head	Splash	Bosch	Disc
Marmon	C. Patschke	1911	4	4.37	5.0	299.0	32	T-head	Splash	Bosch	Disc
Marmon	Joe. Nikrent	1911	4	4.37	5.0	299.0	32	T-head	Splash	Bosch	Disc
Ohio	McFarlane	1912	4	4.50	4.75	302.2	40	T-head	Pump	Splitdorf	Disc

Bruce-Brown, last year's Grand Prix winner, being timed in a fast pract tice trial over the Savannah course in his Fiat car

Cars Entered in Savannah Road Races

won the Grand Prix last year, traveled over the course at the rate of 80 miles an hour. This is the road record here. Not a single accident marred the practice. Summary:

Car	Driver.	Lap time	Fastest time M.P.H.
Fiat	Bruce-Brown	13:40. 12:57.6 14:18. 14:15. 14:30.8	80
Fiat	Matson	13:30. 13:26.4	77.4
Fiat	Bragg	15:18.8	68.6
Mercedes	Wishart	14:38.6 13:27.6 13:29.8 13:32.6	77.3
Mercedes	De Palma	15:04.8 32:34.2 35:02	68.4
Lozier	Grant	14:23. 14:17	72.9
Lozier	Mulford	13:45.2 22:38.6 17:38.8	76
Benz	Bergdoll	13:45	76.2
Pope Hummer	Disbrow	15:30 13:43	76.3
Mercer	Hughes	15:47. 13:36.2 15:20	77
Abbott-Detroit	Mitchell	16:26.4	63.3

Under the present plan the course will be open to the exclusive use of the drivers in each of the classes at specified times. The small cars will be allowed to practice at speed for 1 hour before noon each day, while the Vanderbilt Cup cars and Grand Prize contestants will come on the scene later in the day.

The Savannah Challenge trophy and Tiedeman Cup races will be called at 7 o'clock next Monday morning. The first event is thirteen laps of the 17.14-mile course, or 222.82 miles. The Tiedeman is ten laps of the circuit, or 171.4 miles. The two races will be run together. It has been estimated that the speed achieved in the Savannah Cup race will approximate 62 or 63 miles an hour. If that proves to be accurate, the race will be finished at about 11 o'clock. Several of the contesting cars named in this event have shown speed in excess of the figures given.

The difference in mileage between the Savannah and Tiedeman races will probably cause the smaller cars to complete their race considerably before the Savannah cars finish.

It is planned to start the Vanderbilt Cup race about 11.30 o'clock. This race consists of seventeen laps of the course or 291.38 miles. If a speed a trifle in excess of 70 miles an hour is made, the race will be over at 3.30.

It is quite likely that the Grand Prize cars will be sent away early in the morning of Thanksgiving Day. The exact hour has not been fixed for the start, but it will surely be before 8 o'clock. The distance of the Grand Prize race is twenty-four laps of the course or 411.36. Traveling at the rate of 75 miles an hour the winner cannot finish the distance under 5.15. If the start is at 8 o'clock, this would bring the finish to 1.15 p. m.

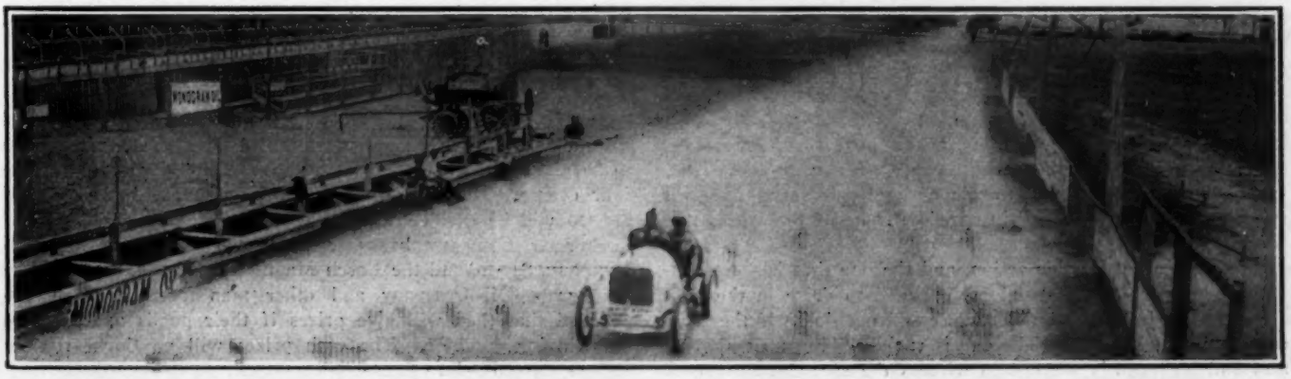
The Marmon drivers seem to have a strenuous time ahead of them as Dawson and Patschke are scheduled to start with a pair of small cars in the Savannah Challenge Cup race at 7 o'clock Monday morning. As soon as this contest is finished the pair will assume the handling of two big Marmons in the Vanderbilt Cup race and on Thursday both will drive in the Grand Prize. Hughes, captain of the Mercer team will have his hands

GRAND PRIZE—24 LAPS—411.36 MILES—NO LIMIT TO DISPLACEMENT

Car.	Driver.	Model.	Number Cylinders.	Bore, Inches.	Horse-power.	Cylinder Type.	Lubrication.	Ignition.	Clutch.
Abbott-Detroit	C. A. Timberg	1912	4	4.50	44	L-head	Pump	Bosch	Dry Plate
Abbott-Detroit	L. A. Mitchell	1912	4	4.50	44	L-head	Pump	Bosch	Dry Plate
Benz	Erwin Bergdoll	1912	4	6.10	120	Valve	Splash	Bosch	Cone
Benz	Victor Hemery	1907	4	6.10	120	Valve	Splash	Bosch	Cone
Benz	Eddie Hearne	1912	4	6.10	120	Valve	Splash	Bosch	Cone
Lozier	Ralph Mulford	1911	4	5.38	46	T-head	Splash	Bosch	Disc
Fiat	D. Bruce-Brown	1912	4	5.91	90	T-head	Pump	Bosch	Disc
Fiat	C. S. Bragg	1912	4	5.91	90	T-head	Pump	Bosch	Disc
Fiat	Louis Wagner	1912	4	5.91	90	T-head	Pump	Bosch	Disc
Marmon	C. Patschke	1912	4	4.75	36	T-head	Splash	Bosch	Disc
Marmon	Joe Dawson	1912	4	4.75	36	T-head	Splash	Bosch	Disc
Pope-Hartford	L. A. Disbrow	1912	4	5.50	50	T-head	Splash	Bosch	Cone
Buick	Harry Cobe	1912	4	6.00	100	Valve	Splash	Bosch	Cone
Buick	Chas. Basle	1912	4	6.00	100	Valve	Splash	Bosch	Cone

TIEDEMAN TROPHY—10 LAPS—171.4 MILES

Car.	Driver.	Model.	Number Cylinders.	Bore, Inches.	Stroke, Inches.	Displacement, Cubic Inches.	Horse-power.	Cylinder Type.	Lubrication.	Ignition.	Clutch.
Abbott-Detroit	M. Roberts	1912	4	4.13	4.25	227.2	44	L-head	Pump	Bosch	Dry Plate
Abbott-Detroit	H. L. Hartman	1912	4	4.13	4.25	227.2	44	L-head	Pump	Bosch	Dry Plate
E. M. F.	Frank Witt	1912	4	4.0	4.5	226.2	30	L-head	Splash	Splitdorf	Cone
E. M. F.	Robert Evans	1912	4	4.0	4.5	226.2	30	L-head	Splash	Splitdorf	Cone
E. M. F.	Jack Tower	1912	4	4.0	4.5	226.2	30	L-head	Splash	Splitdorf	Cone
Ford	Kulick	1912	4	3.75	4	176.7	22.5	L-head	Splash	Ford	Disc



View of the upper end of the stretch, showing grand stand and pits—Hearne in Benz finishing his fast practice lap

Where the Lozier team is camping during practice week

full on Monday when he is scheduled to drive a small car in the Savannah and the new Mercer six-cylinder car in the Vanderbilt.

Bruce-Brown will drive a Fiat in both Vanderbilt Cup and Grand Prize races; Mulford will drive a Lozier in both; Limberg and Mitchell will handle Abbott-Detroits in both big events; Disbrow will drive the Pope Special in both. Harry Cobe is the only driver who will handle two cars of different makes at the meeting, driving a Buick in the Grand Prize and a Jackson in the Vanderbilt. All the other pilots have but a single mount.

The fields, from present indications, will not be large. The total official entry list for the four events to date comprises only forty-two cars, a reduction of twelve from the estimated entry list of last week. The box is still open and other entries may be made officially until Wednesday midnight, but it has been unofficially announced that if anyone wants to go in any of the races he can make legal entry on Friday.

Referee Morell made a circuit of the course this morning and pronounced it better than ever before as the result of the radical improvement upon it in preparation for the races.

On Saturday night a meeting of the drivers and mechanics was held at which preliminary instructions to cover practice were given out.

It is believed that the plan adopted to run the light car races before the Vanderbilt Cup will result in better time in each of the three races. In such contests the presence of mixed classes always has a tendency to develop slower time, particularly in passing on the turns. If all the cars engaged have approximately equal maximum speed, there is less likelihood of delays. The effect will be not only to make the races faster, but it is expected to make them safer as well.

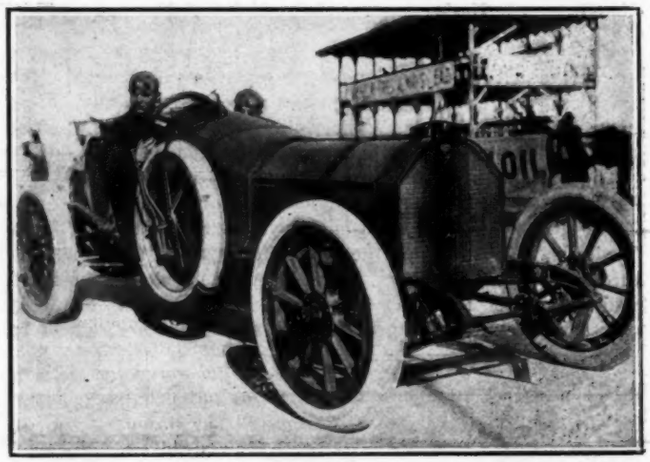
The reason underlying the action of the committee in separating the light classes from the Vanderbilt was the well-known ability of some of the drivers engaged in these contests to make the slower car win. This of course may be accomplished legitimately by good jockeying in case the contest developed a tight fit. If a car, slightly slower than a rival automobile, is in the lead and the pilot drives desperately upon approaching a turn, it may be possible for him to get away so far that the pursuing car not not catch him until the next turn, where the process may be repeated. In this way a narrow margin of advantage may prove enough to win or gain prominent place for a car that is not quite equal in speed to some of the others that finish behind it.

Another reason for this action, and the one that is most generally emphasized, is that drivers engaged to drive in the light car events and the Vanderbilt Cup, could not do so if the races were run coincidentally. The city is rapidly filling up with visitors and big crowds are out to witness the speed practice each morning. A rule has been promulgated barring women from the racing cars in practice and prohibiting drivers from moving in the reverse direction of the course.

In the Grand Prix there is no limit to the piston displacement. The Vanderbilt Cup, however, provides for a piston displacement of 301 to 450 cubic inches; the Savannah Challenge Trophy for cars of 231-300 inches piston displacement, and the Tiedeman Trophy for cars of 161 to 230 cubic inches displacement inclusive.

Of the forty-two cars entered there are fourteen machines in the Grand Prize, the same number in the Vanderbilt; six in the Tiedeman Trophy and eight in the Savannah Challenge Trophy event.

Over $20,000 has been spent on the course and over $5,000 on the home-stretch alone. All turns have been banked and the course widened to 40 and 50 feet. At other places the course has been cut through a forest, thereby cutting out several bad turns



Dawson in the Marmon—hurt during a morning tryout

which bothered the big cars very much last year. The home stretch is almost like a boulevard, especially that section between Dale avenue and Waters road which was unbanked last year, and until passing the general admission grand stand, a quarter of a mile from the turn. The course has been widened here to over 40 feet.

New arrangements have been made to enable spectators to get to the grand stand. Instead of having to walk from the car line for a quarter of a mile, a new belt line has been built up to the stand on which cars will be run every 30 seconds.

The course will be guarded by the militia of Savannah. Around the stand and in the city limits the police will look after things.

The prices this year are: For the grandstand $3 for two days; for the admission stand, $1 each day. Boxes for two days, $50 and parking spaces, $25. Because of the unexpected rush for boxes, ten additional ones had to be made. The grandstand has been improved by boarding up the back. Last year the wind blew under it and made it very disagreeable for the spectators. The press stand and official judges' stand have all been repaired and are now in first-class condition.

Prize List Largest in the Country

The prizes this year are probably larger than any ever offered for racing events in this country. All told, there is over $30,000 to be given the winners of first, second and third places in the four events. The cash offer of *The Savannah Automobile* of $12,500 will be divided for the four events, while the Rayfield Carbureter Company has offered $2,500; the Remy Magneto Company, $4,250, and the Bosch Magneto Company, $1,400. The Monogram Oil Company and other manufacturers have announced that they will give prizes if their goods are used on the winning machine. The cash prizes will no doubt run as high as $40,000 before the races are over.

A prominent Savannah man, who gave $1,000 last year for

the first American car finishing the race, has announced that he will give $1,000 this year, but this time it must be an American car winning the race and not the first one to finish.

A large canvas tent will be placed in the Park Extension, the soldiers' parade-ground to accommodate the many cars that will be here during the week.

The hotels are rapidly filling up but still have rooms left. The homes of the people in the city have been thrown open just as was done last year and room for over 30,000 visitors is available.

During the days when there will be no racing a football game between Georgia Tech. and Auburn will take place. There will also be an aviation meet, with several of Curtiss' best men. Those in charge of this event are trying to get up a match between one of the aircraft and a Benz or Fiat racing machine.

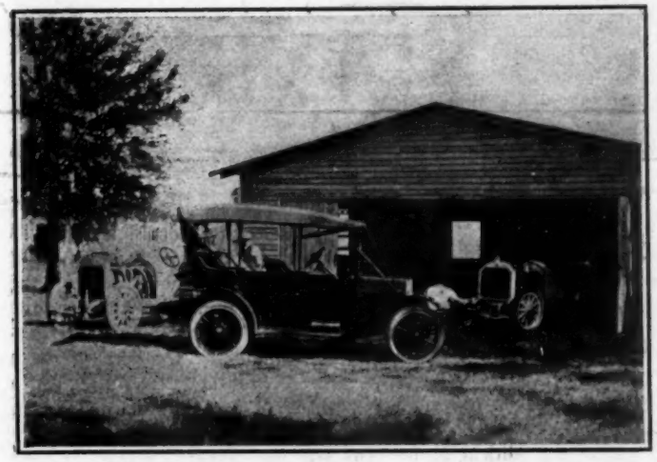
Racing Circuit Planned in Middle West

SIOUX CITY, NOV. 20—At a meeting of the Sioux City Automobile Club last week it was decided to push all improvements on the new speedway to be constructed here and have them completed by July 1. The committee was instructed to obtain estimates on grading for a saucer-shaped mile track, on an 8-foot grade and on a 12-foot grade, and also for an oblong track with grades on the curves of 8 feet and 12 feet. Among other improvements a club house will be built at the speedway.

George O. Jamesson resigned as president of the club as he moved to Des Moines to take the State agency for the Apperson and Reo automobiles. C. S. Douglas of the Nebraska Buick Automobile Company was elected to succeed him. F. H. Reid was elected secretary to fill a vacancy caused by the resignation of C. S. Douglas.

H. B. Groves becomes the manager of the Interstate Auto & Supply Company which position Mr. Jamesson held.

There is some talk here of promoting a circuit of automobile



Visitors at the Benz camp at a farmhouse alongside the course

races taking in Omaha, Lincoln, Sioux Falls and Sioux City.

Omaha, Sioux Falls and Sioux City held successful race meets during the past season and are improving their speedways, and it is thought that if the four cities mentioned should go into a circuit the manufacturers would send some of the fastest cars in the country to participate in the races.

Jersey Motorists Join for Good Law

New Jersey automobilists are now a unit in favor of a new, moderate, sensible automobile law. The recent election changed the complexion of the legislature of New Jersey to such an extent that much hope for better things is springing up in the hearts of the automobile fraternity.

As an indication of concerted action and solid ranks among the motorists the fact has become known that the New Jersey Automobile and Motor Club, the large organization that split away from the American Automobile Association and the Associated Automobile Club of New Jersey last year, has made advances to the Associated Clubs and the New Jersey Automobile Trade Association to join hands with it in drafting a new automobile law for presentation to the coming session of the legislature.

With this idea in view the New Jersey club, the Associated Clubs and the Trade Association have formed a committee of fifteen, five from each organization, and empowered the committee to act. The committee has been instructed to draw up a bill repealing the noxious power-of-attorney clause in the present law, by which visiting automobilists are obliged to sign instruments empowering the Secretary of State of New Jersey to accept service for them in case of alleged infringements of the Motor Vehicle law. The bill will also be framed to provide for a reasonable exemption of visiting automobilists.

The measure advocated by the trade body and the association of clubs, which was built on the lines suggested above, was defeated by a single vote in the upper house after being passed by the assembly. The composition of the Senate remains almost the same as it was before, but the Assembly has been radically changed.

Legal Matters That Interest Motordom

Three legal matters of importance to the automobile industry are being considered in the courts at New York at this time. Another preliminary injunction has been granted by the federal court in one of the Weed chain cases. This is similar to a host of other proceedings based upon the same subject matter. The defendant in this case was the Seneca Chain Company.

The second matter is the pendency of the decision of Judge Hazel in the suit of the Republic Rubber Company vs. Morgan and Wright, involving an alleged infringement of the knobby tread patent. The third interesting case is the suit of Fletcher R. Williams vs. the Lozier Motor Company, based upon an alleged agreement to sell the control of that company. This matter will be heard by Justice Seabury in part 1 of the Supreme Court on Thursday.

Delaware Club Holds Annual Banquet

WILMINGTON, DEL., NOV. 20—The annual banquet of the Delaware Automobile Association, which was held Friday night at the Clayton House, in this city, was a notable event. About 100 persons were present, mostly members, though there were a few guests, including Robert P. Hooper, president of A. A. A.; H. M. Rowe, president of the Maryland Automobile Association, and Powell Evans, president of the Automobile Club of Philadelphia.

The tuning-up process at the Mercer camp keeps all hands busy

Automobile Metallurgy Made Easy

By E. F. Lake

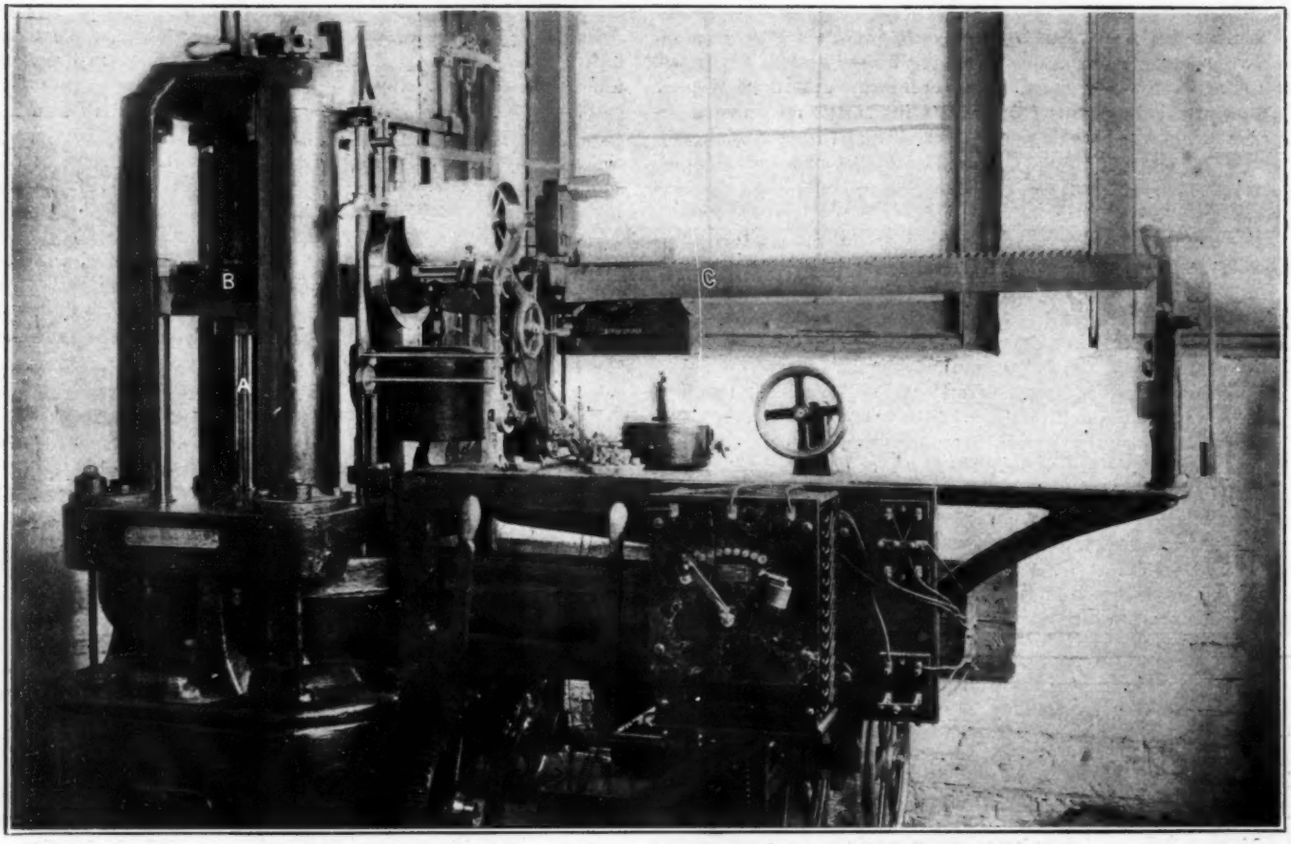


Fig. 1—Type of machine used to determine the tensile strength of metals

Part I.--Tensile Strength

TENSILE strength is a term frequently used by engineers and designers of automobiles, as well as by those who are manufacturing the metals for, or into, the numerous parts that enter into the construction of a motor car. The term is so familiar to them, they never think that the buyer or user of a car is nearly always one whose line of work, or energies, has carried him into other fields in which he seldom hears these words and thus has no occasion to know their meaning. Even many of those who sell cars do not always know the meaning of the term. It is therefore well to start at the beginning and define its meaning, as well as show how important it is in the selection of materials for the car's construction, or in deciding on the size and shape of the parts. It is a term that should be thoroughly understood.

Announcement

In this issue THE AUTOMOBILE begins a series of articles under the title "Metallurgy Made Easy." This series will continue from week to week and will cover the entire gamut of metals as applied to the automobile. The aim of the series is to familiarize the lay reader with the terms used in metallurgy as well as the different metals, their strengths, uses, etc. The articles are written in language to suit the beginner, the man who has heard of tensile strength, elastic limit, reduction of area and the many other terms. The series will take up in elementary form the different metals which enter into the construction of the automobile, including Bessemer steel, open-hearth steel, electric furnace steel and the many other steels. Readers desiring additional information on the subjects treated in the different articles are requested to write to the Editor and questions will be answered and discussions solicited.

Next week, elastic limit will be the subject.

In selecting the different metals that make many of the parts of a complete automobile one of the most important things to know is the tensile strength of each kind. To obtain this, samples or test bars of each kind are prepared and these placed in a tensile machine similar to the one shown in Fig. 1.

The test bar is first clamped at both ends and pulled apart when the machine is started. The part B, which grips the upper part of the test bar, is then gradually raised by a screw and this stretches the test bar until it breaks. The number of pounds that are required to break this test bar is shown on the scale at C and this is known as the tensile strength. In order to standardize this so it can be compared with all bars tested, it is computed in the pounds required to break one square inch of the surface across the part where the bar is broken.

The test bars are usually made of a definite size before they are broken so that the pounds per square inch can easily be computed and thus made reliable. In Fig. 2 there is shown the standard shapes that have been adopted for both the steel and cast iron

test bar. D is the steel test bar, which is threaded on both ends and has a standardized length between the threaded portions, as well as a standardized diameter. It is screwed into dies that are supplied with the machine and these are held in place by wedges that are also a part of the machine. Test bars that are not threaded may be gripped with the device that holds the cast-iron test piece. Thus square, hexagon, octagon and other shapes may be tested. The diameter of these bars in the center where the break occurs is 0.505 inch and this gives an area of 1-5 square inch. The reading obtained from the scale at C is thus multiplied by five, in order to obtain the tensile strength per square inch.

When it is understood that the tensile strength of the different steels varies from below 60,000 to nearly 300,000 pounds per square inch one can readily see the importance of the tensile strength of the various parts that go to make up and complete the automobile. When the steels of the lower tensile strength are used, the sectional area of the piece, that is, the distance through the thickness, or the width, or both, must be greater than when the steels of the higher tensile strength is used. For many parts of the car almost any metal is sufficiently strong, and for these the metals of the lower tensile strength can be used, as these are invariably the cheapest. There are many parts, however, where strength is of vital importance, and for these it is necessary to know the tensile strength of the material to be used before the designer can say what size it is to be made or from what material.

The higher the tensile strength is in the steel the higher will be the cost of the materials used in its manufacture, as the greater will be the amount of labor and skill required in its manufacture. If steels of the lower tensile strength per square inch are used, the number of square inches in their sectional area must be much greater than when steels of the higher tensile strengths are used. This would make the various parts heavier than they need be and would add greatly to the weight of the complete car. It would thus require considerably more engine power to drive it than would be the case when metals of a higher tensile strength are used. The difference, therefore, between cheap metals that must be comparatively large in section owing to their low tensile strength and the higher-priced materials that have a high tensile strength and can be made comparatively small in section is often a difficult problem for the engineer and designer. Sometimes the high-priced materials are as cheap to use as the low-priced, owing to the fewer pounds that are needed from which to manufacture the given part. Occasionally a designer has used the cheaper material and made it the same size as he would the more expensive material, but this nearly always resulted in a breakage.

Some factors that affect the tensile strength of steel to a large extent and of other metals to a lesser degree are their mechanical working; that is, after steels are rolled, pressed or forged their tensile strength is considerably greater than when they are first cast into ingots. Likewise, the steels, especially, have their tensile strength greatly altered by their heat treatment; that is, annealed steels are considerably lower in tensile strength than steels that have been properly hardened and tempered. This greatly benefits the different parts of an automobile.

It is not the purpose of this article, however, to go into details of design, what materials should go into the various parts or the working and treatment of the metal. Its object is to call attention to the necessity of having them of the required tensile strength.

Aluminum is very light but has very little tensile strength, this being from 12,000 to 20,000 pounds per square inch. It, therefore, is used for engine cases, gearboxes, and such parts as keep dust and dirt away from the working parts, and are not subjected to any great strains and stresses. It makes the car lighter and less engine power is needed to drive it.

An attempt is being made to use sheet metal for these parts, owing to the weakness of aluminum castings. The sheet metal would have a greater tensile strength for the same weight but is quite difficult to form into the shapes needed and supply them with the thick bosses and lugs that are required in various parts of such cases.

Other parts, such as carbureters, levers of many kinds, etc., are made from the brasses and bronzes. Castings from these vary in tensile strength from 30,000 to 85,000 pounds per square inch and are useful in many places where great strength is not required, but more strength than aluminum gives.

For many other parts malleable iron, cast iron, steel castings and other metals are used. These vary in tensile strength from the 5,000 to 10,000 pounds of the bearing metals to the 85,000 pounds per square inch that is shown by some steel castings. Bearing metals, however, only require compressive strength, which is the opposite of tensile strength. That is, instead of pulling apart the test bar, it is squeezed or compressed until it gives way or is crushed; the number of pounds required to crush it being its compressive strength.

Of the steel parts, such as steering knuckles and their connecting rods, the best of metals that have a high tensile strength must be used. Breakage of these means that the driver cannot steer the car and unless he can stop it suddenly, a bad accident is liable to occur. Quite a number of accidents of this kind have resulted in occupants of the car losing their lives. The crankshaft of the engine is another part that is given great strains every time an explosion occurs in the cylinders and this must have a good tensile strength. The driving shaft, axle shaft, transmission gears with their shafts and differential gears are some of the other parts that are subjected to great strains and stresses and consequently must have considerable strength.

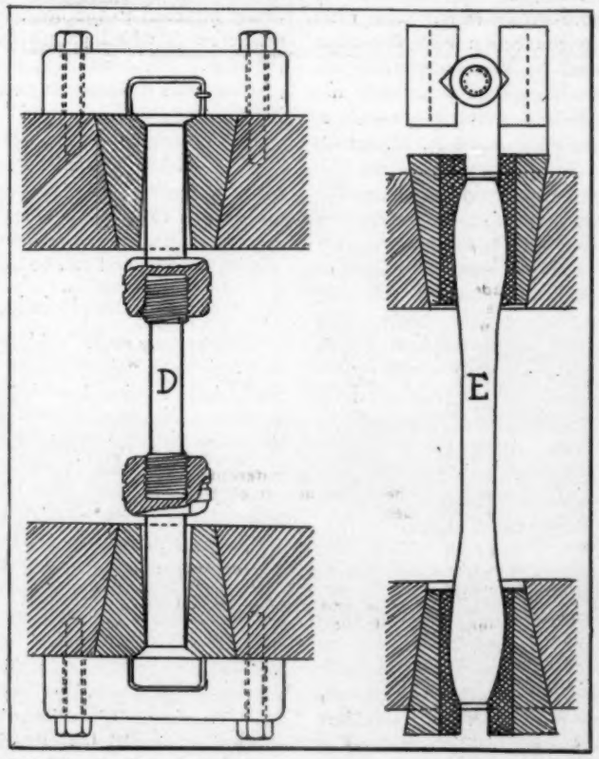


Fig. 2—Standard shape adopted for steel and cast iron test bars

The strains and stresses produced in an automobile by its traveling over rough roads make it imperative that the frame, front and rear axle, driving shafts and gears and all the moving parts have the required tensile strength, as on this largely depends its life and safety, as well as the safety of the car's occupants.

If any of the materials used are porous, spongy or full of blowholes there is an interruption in the cohesive force that binds the molecules of the mass together and hence it cannot have the tensile strength that it should.

Knox Adopts Long-Stroke Motor

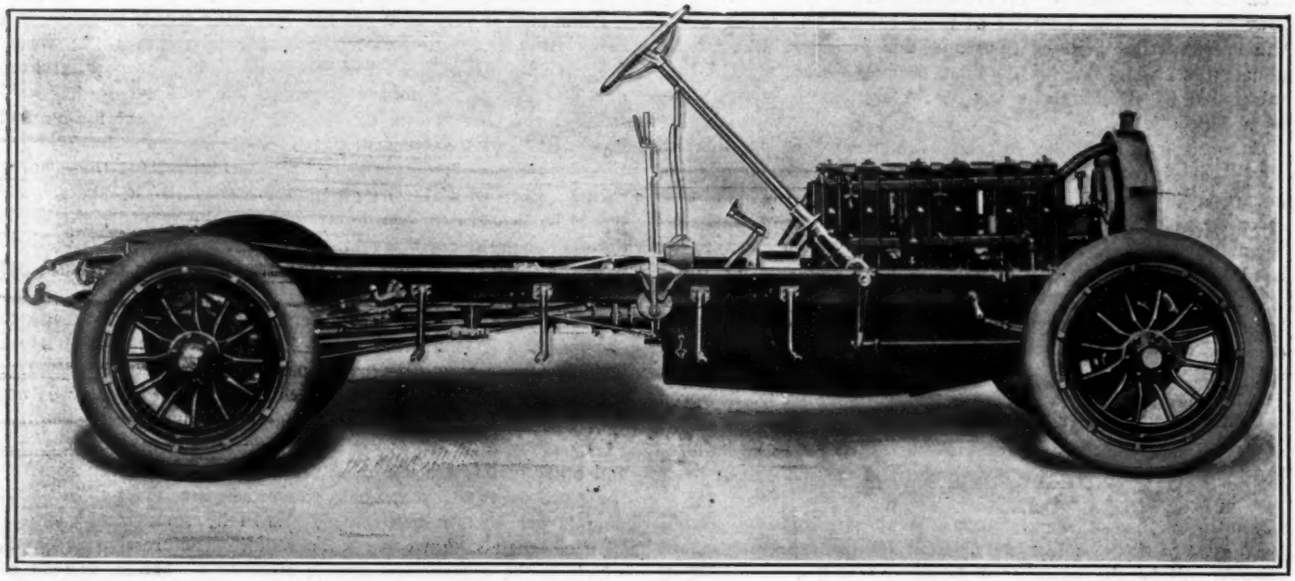
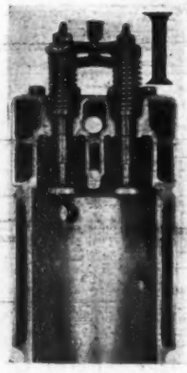


Fig. 1—Side elevation of the six-cylinder Knox chassis, showing suspension and control



IN bringing forward the line of cars for the season of 1912, the Knox Automobile Company, of Springfield, Mass., has departed from its time-honored policy of building nothing but short-stroke motors and has adopted, in connection with the new chassis which features this year's output, a motor having a 1.1 bore-stroke ratio. The ratio which is used in connection with the other motors constructed by this company is .95.

The new motor has a bore of 5 inches and a stroke of 5.5 inches, giving a horsepower of 40, according to the A. L. A. M. rating. The motor has four individually cast cylinders, as may be seen in Fig. 3. The cylinders are water-cooled, the water-jackets being cast integrally with the cylinders. The valves are located in the cylinder heads and are operated by means of rocker arms R and tappet rods T, which take their motion from the camshaft C, located on the right side of the motor. The cylinder heads are removable, being attached to the body of the cylinder by means of four bolts which screw into bosses on the cylinder casting. A copper asbestos gasket is placed in the joint between the head and body of the cylinders so that it will be secure against leakage. The gasket fits into a deep groove in the upper part of the joint, while a concentric tongue fits into the groove G and holds the gasket tightly in place. The valves V are of the flat-seated type, according to the practice maintained by the Knox concern. They are made from a solid piece of nickel steel alloy and are of generous proportions, thus allowing for a wide seat. Both the tappet rods and upper ends of the valve stems have cup-shaped openings to receive the case-hardened ends of the rocker arm; oil is placed within the cup in which the ends of the rocker arms work in order to eliminate noise to the greatest possible extent and to prevent undue wear upon unlubricated surfaces. To further prevent noise an auxiliary is fitted in addition to the regular valve spring, thus making up all lost motion and increasing the efficiency of the whole mechanism. The regular valve spring and auxiliary are shown at A and B.

The crankshaft is a drop forging running upon five plain bearings which are carried on webs in the crankcase casting. The crank bearings are fitted with babbit bushings which are recessed, thus forming a firm bearing for the connecting rod. The pistons are flat-head castings having three rings above the wristpin and one near the bottom of the piston. The wristpin is firmly attached to the boss, into which it is fitted by means of a set screw S which passes completely through the pin and into the boss. The connecting rod bearing cap is fastened by means of four bolts of large diameter. These bolts pass through bosses in the connecting-rod end.

The camshaft which operates the tappets is made from a single solid bar of nickel steel, finished and ground to size. The cams and gears are cut integrally, while all the wearing parts are ground to size and then hardened. The shaft runs on three plain bearings which are lined with phosphor bronze; the central bearing is split and can be adjusted for wear.

Same Lubrication System Used

The new motor is lubricated in a manner identical with that of previous models of Knox cars. The system used is the force feed, the oil being kept in constant circulation by means of a gear type of pump. The pump is driven by means of a vertical shaft which is operated directly off the camshaft. This shaft not only drives the oil pump but also rotates the timer. The oil reservoir is in the lower half of the crankcase and forms an integral part of the engine casing. The oil level in the reservoir is never permitted to rise to such a height that the connecting rods will dip into the oil, as this would put too much oil into the cylinders and cause the motor to smoke.

The oil pump, which is of the gear type, draws the oil from the reservoir in the crankcase and forces it through the main oil feed pipe to the other side of the motor, where it is led into a longitudinal pipe. The leads for the main bearings are tapped into this pipe. Oil is forced into the crankshaft once in every revolution when the opening in the shaft registers with the opening in the oil lead. The crankshaft is drilled as well as the

crank-checks and the crankpin; the oil flows along the crankshaft under pressure and is thrown into the crankpin by centrifugal force due to the revolving shaft. The crankpin has an opening drilled through it in a direction perpendicular to the axis through which the oil will flow to the bearing by centrifugal force. This opening registers with an opening in the lead to the wristpin bearing through which the oil will flow. A certain amount of oil is thrown from the cranks as they revolve and this suffices to lubricate the cylinder walls. The surplus oil drains back to the reservoir, whence it is again drawn through the system after having been passed through a wire mesh strainer.

A noteworthy feature in connection with the lubricating system on the Knox cars is the spring connection on the pump shaft. This is so arranged that in case the pump becomes clogged nothing important will be broken as the spring will snap past the catch. A pressure gauge showing the pressure head delivered by the oil pump is located on the sloping floor-board of the car. The oil is supplied to the tank on the left side of the motor and the quantity contained therein may be at any time determined by means of a level gauge cock.

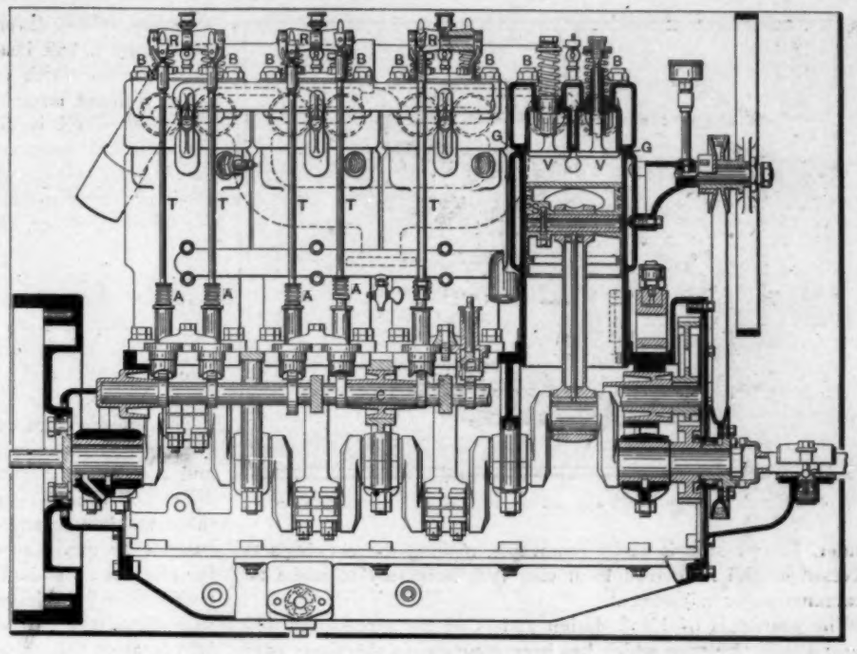


Fig. 2—View of the new Knox four-cylinder, long-stroke motor

Two Systems of Ignition

Ignition is effected by means of two independent sets of spark plugs, one of which is operated by means of a Bosch D-4 type magneto, located on the left side of the motor, while the other set of plugs for starting purposes is connected to a Columbia battery set and a 4-unit Connecticut coil. The two-way switch is located on the dash in the usual manner. These two systems are absolutely independent of each other and hence may be operated at the same time if desired, or in case of the derangement of either, the car may be readily run upon the other set.

The water circulation is maintained by means of a centrifugal pump. The water enters the cylinder jackets at the lowest point and has its outlet near the top on the right side. The water does not pass through the joint made by the connection of the cylinder head and cylinder castings, but passes from the lower casting into the upper by means of an outside fitting. Each casting, therefore, will have two water connections, an intake and an outlet. The radiator used in connection with the cooling system is of the tubular type.

The carbureter used is of the Stromberg make, having a single jet and float feed. It is located on the left side of the motor and supported by the Y-shaped intake manifold.

The clutch may be seen in Fig. 4. It is of the three-plate dry type and is provided with cork inserts in the cast-iron facing. The clutch is located in the flywheel as shown and the tension is maintained by means of coil springs which hold the frictional members of the clutch tightly in place. Easy disengagement is effected by means of the clutch pedal operated from the driver's seat, this pedal actuating a sliding sleeve which in turn disengages the plates. The whole clutch mechanism is enclosed in a dust-proof casing which serves to protect it from dirt and

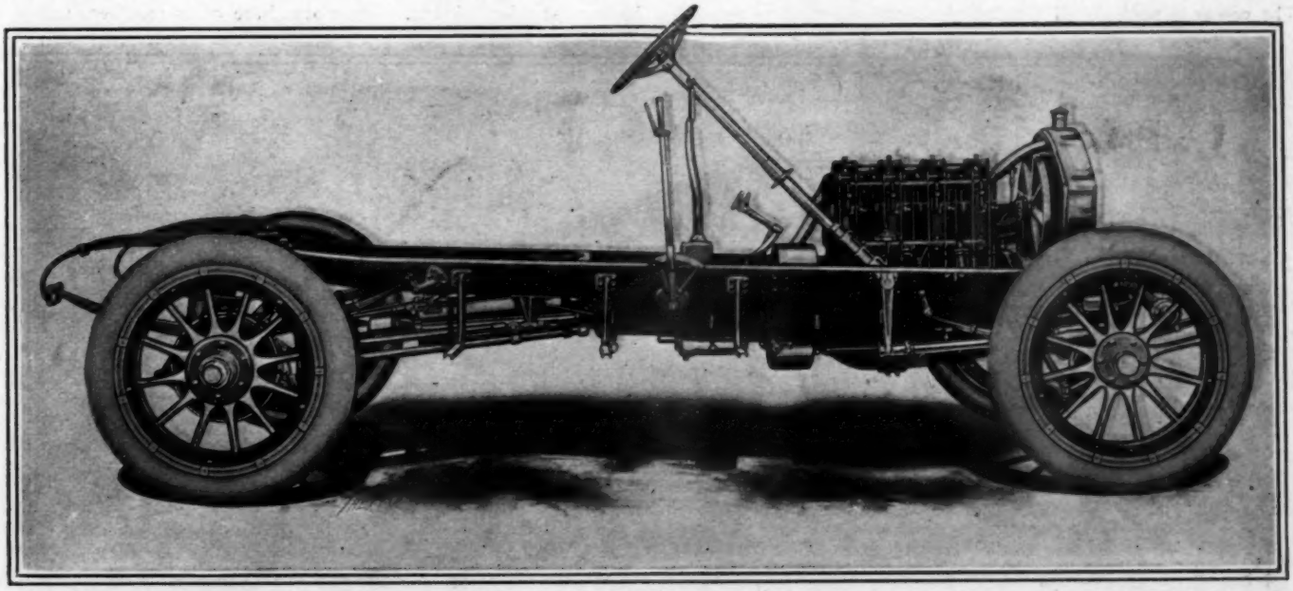


Fig. 3—Chassis used in connection with the Knox four-cylinder, long-stroke motor

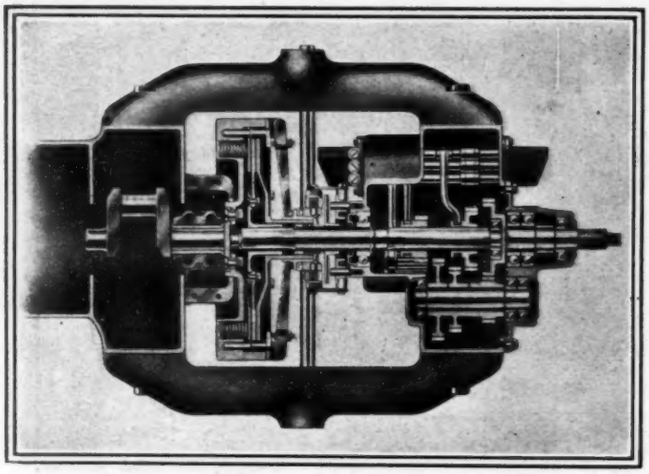


Fig. 4—Plan view of the clutch and gearset housing with the cover removed

water. The casing is easily removable, making the clutch parts accessible with little trouble in case it is necessary to make an examination or adjustment.

The gearset is of Knox design and is of the three-speed and reverse selective type which has been common to the Knox cars in the past. It is shown in detail in Fig. 4. A slight change has been made in one of the details of construction in that the rear of the main shaft and the lay shaft run on a double row of Hess-Bright ball bearings. Both the shafts and gears in this part of the transmission are made of nickel steel, the shafts being specially hardened while the gears are so constructed as to do away with keys. No universal joint is used between the clutch and the gearset, the two being so constructed that one is practically a continuation of the other. They are covered by the same housing and are separated by means of a packing gland inserted in a partition in the housing which serves to divide the clutch and gearset compartments as well as to provide a means of stiffening the construction.

Features of the Knox Drive

A universal joint is placed just aft of the gearset housing, separating it from the propeller shaft. Another universal joint is provided at the rear end of the shaft to take care of any changes which may occur in the alignment of the drive owing to the different compressions of the springs under varying loads. The power is transmitted through the shaft and then to the differential. The differential shaft is a short member and is carried by a ball bearing at either end. At the rear end the bevel pinion, which is an integral part of the short shaft, engages with the large bevel wheel which operates the differential; this gear wheel is also carried upon ball bearings which are supported by means of webs in the differential and floating axle housing. The axle shafts are also carried upon ball bearings at either extremity and are easily accessible by simply removing the hub cap, which discloses the ball bearings upon which they are carried. The live axles are squared at their inner ends so that they may be readily withdrawn for inspection, by simply pulling them out. The differential gears are very easily accessible also and may be taken out of the housing by removing the casing cover which is fastened by means of a series of small bolts. The differential and axle housing are of pressed steel while the gears themselves are of nickel steel.

The brake drums are located on the rear hubs. The service brakes are operated by means of a pedal from the driver's seat and are of the contracting type, having a face of 3 inches in width and 14 inches in diameter. The bands are held free from the drums at top and bottom by springs which are rendered adjustable by means of lock nuts. The emergency brakes are of the internal expanding type and are operated by a hand lever. A movement of the lever turns a cam which is so arranged that it will spread the two shoes of the brake apart, causing them to bear against the internal surface of the drum. The shoes are lined with Raybestos and are kept free from the drums when not in use by means of springs. Both brake outfits are controlled by equalizers which are so constructed that an equal pull will be exerted upon each brake.

Details of the Knox Chassis

The wheels are of the wood artillery type, equipped with Fisk bolted-on tires mounted on demountable rims of the same make. As an option, Universal rims and clincher tires may be had by the purchaser. The sizes usually fitted are 37 x 5 inches, although the rims will also accommodate 36 x 4.5-inch tires. The wheelbase is 126 inches and the tread the standard 56 inches.

The chassis frame is of unusually heavy construction and has a single drop. The depth of the metal in the new model chassis is 5 inches while the width of the channel flanges varies at different points along the length of the chassis in accordance with the distribution of weight and strains. The flanges of the side members widen rapidly from the attachment point of the front spring shackle and extend back with unusual width until past the point of power unit support, from where the flange tapers back to standard width. There are three cross members to the

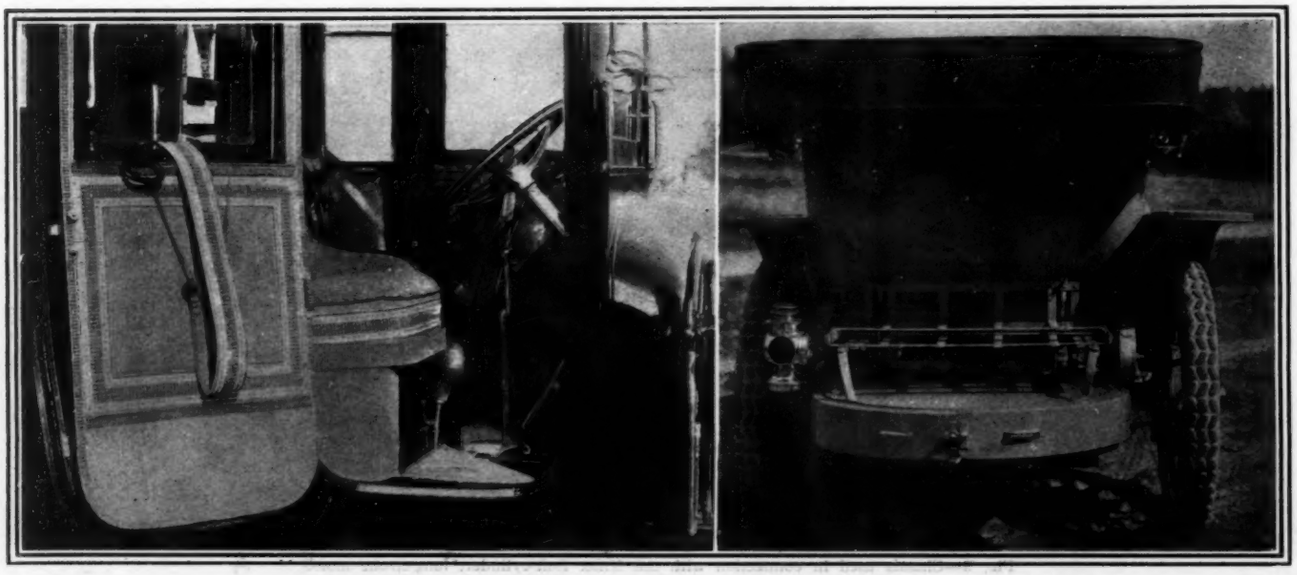


Fig. 5—Interior of the limousine and the rear of the touring model. Note tire trunk

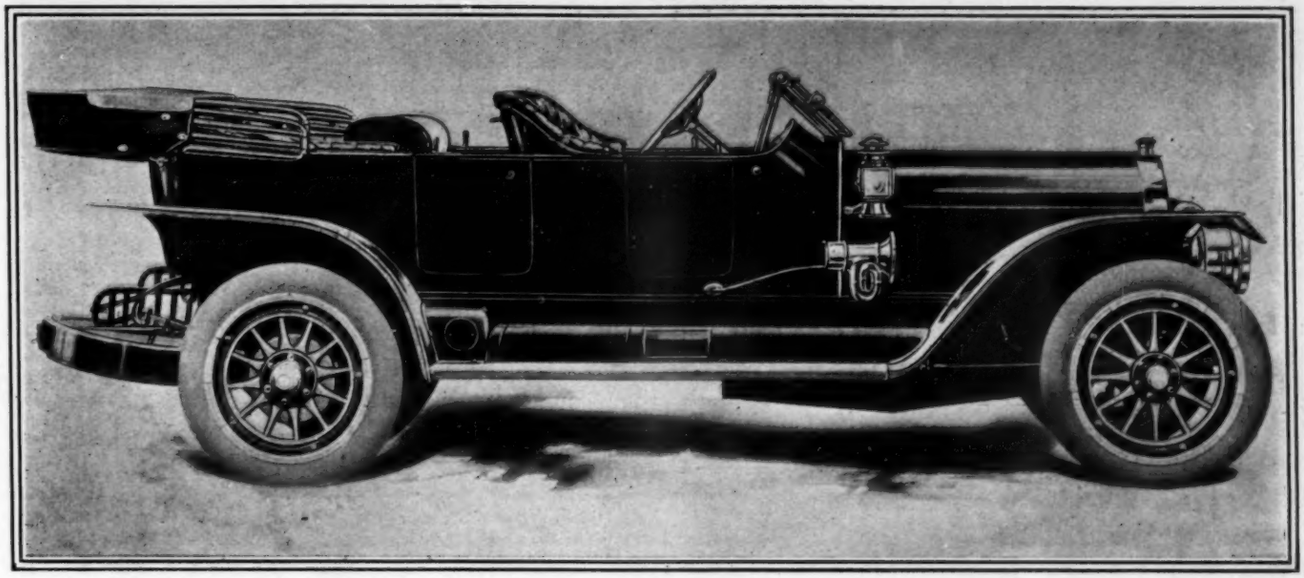


Fig. 6—The fore-door, seven-passenger touring car with six-cylinder motor

frame, one at the extreme front end, another at the rear and the third at a point just above the forward universal joint in the driving shaft. The latter carries the forward extremity of the torque rod. The two engine supports also form sub-cross members as they help to stiffen the frame, and in a somewhat lesser degree the three tubes in the brake mechanism help to do the same thing. The material of the whole frame, in so far as the main and sub-members are concerned, is of cold pressed, heavy gauge nickel steel.

Features of the Knox Suspension

Semi-elliptic front and three-quarter elliptic rear springs are used on all models of the Knox cars. The front springs are 42 inches long and the rear 54 inches. They are of alloy spring steel and are made by the Spring Perch Company. Shock absorbers are fitted to all the springs in order to give an easy-riding car with a long-lived suspension. Spring lubrication is effected by means of extra large grease cups which are fitted to the shackle bolts. Shackle bolts and pins are all hardened and ground to size.

Steering is done by means of an irreversible gear of the double left- and right-threaded worm type. The two worms are operated through an 18-inch hand wheel and are connected to the nickel steel rocker shaft by means of a drop arm. The steering column is bolted to the frame and secured in such a manner to the footboard that no vibration will be felt in the wheel. Adjustment for wear is readily made by means of a large nut located on the exterior of the steering gear housing. The fore-and-aft rod is straight and the socket ends are provided with springs to eliminate rattle.

The chassis described is known as the model R-45 and marks the first long-stroke motor built by the Knox people. The other models are the same as those made in former years. No marked changes have been made except in some minor details. The other models made are known as R, S, R-64 and R-3. They are all equipped with four-cylinder engines except the model S, which has a six-cylinder motor.

The equipment fitted to all Knox cars is complete and is as follows: Magneto with cover, Jones speedometer, Gray & Davis lighting system, Presto-O-Lite tank, combination oil and electric side and tail lights, horn, foot rail, robe rail, motor tire pump, gasoline gauge, extra rim, tire cover, tire carrier, number plate holders, steering knuckle covers, top and side curtains, windshield, clock, full set of tools, etc. The colors are optional with the purchaser and in the case of the limousine all the additional fittings necessary in this type of body are included. The tool boxes are arranged upon the foot-board in a convenient manner. The bodies are constructed throughout of sheet aluminum and steel over oak and ash frames.

A large number of details are left optional with the purchaser. These details are not only of minor importance but also embrace the principal features of the construction of a motor car. The motor is one of the optional points. The Knox company believes in the short-stroke motor and for that reason continues to feature them in their line of cars for the coming year; still, at the same time the great amount of popular feeling in favor of the long-stroke type of motor is recognized and hence this style of engine has been incorporated in the Knox line. The purchaser is given the choice of either the long or short motor in any model of chassis which he chooses to select. If the short-stroke type is specified on the regular stock model an additional charge is made for the installation of the long-stroke motor. The same latitude of choice is allowed as far as four- and six-cylinder motors are concerned or left or right control as well as in many other points throughout the car.

Radiators Starting to Freeze

The time of the year has now arrived when it is dangerous to leave the radiator unprotected. It may be well to remember that if 1 1-4 quarts of denatured alcohol are added to each gallon of water the mixture will freeze at 5 degrees below zero.

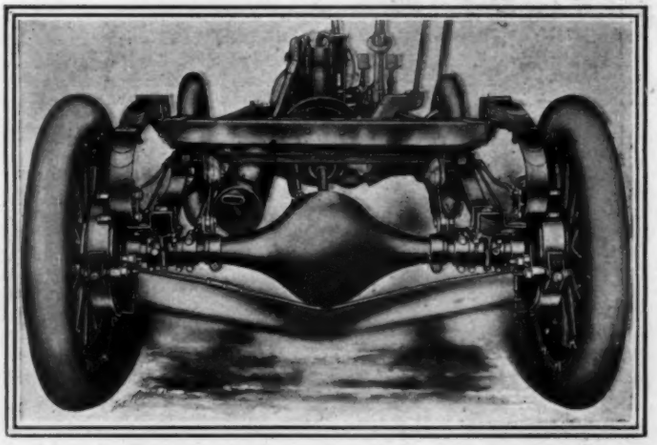


Fig. 7—Rear view of chassis, showing the Knox rear axle construction

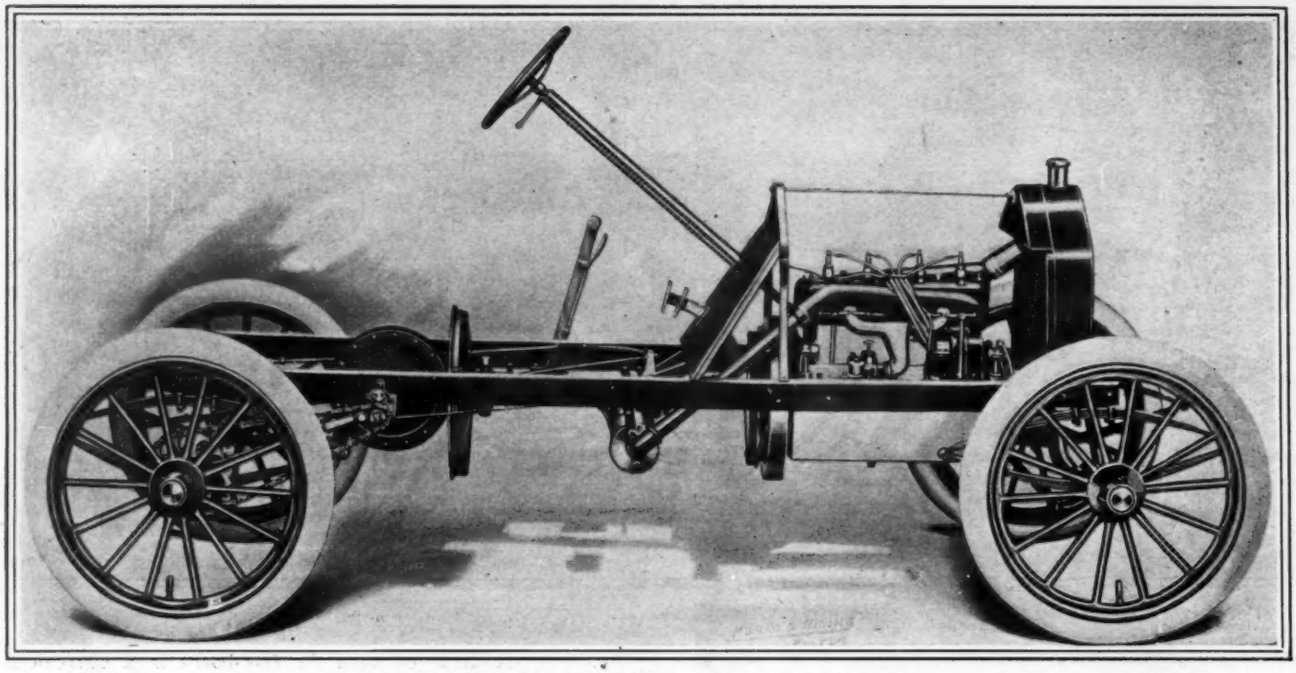


Fig. 1—The chassis of the 1912 Metz car is shown here in elevation

Few Changes Mark the 1912 Metz

THE Metz Company, of Waltham, Mass., makers of the Metz 22, have continued their product for the year 1912 without making radical changes in the design of the car. The motor is rated by the makers at 22 horsepower and is of the four-cylinder en-bloc type. The bore is 3 3-4 inches and the stroke 4 inches. The motor is illustrated in Fig. 2, where it is shown partly in section so that a fair idea of the simplicity of design, which has been made a feature in the construction, may be obtained. The waterjacketing is cast integrally with the cylinders, the upper half being removable and held in place by means of stud bolts, which may be seen in the illustration. The manifolds are held to the waterjackets by means of the dogs D which are secured by the stud bolts that pass through them and terminate in bosses on the cylinder casting.

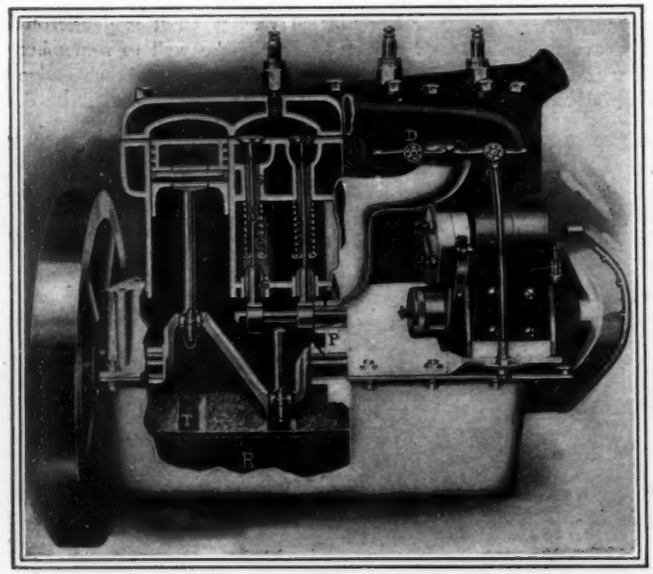


Fig. 2—Semi-sectional view through the Metz 22-horsepower motor

The pistons are constructed with flat heads and are of square section, that is, having the same length and diameter. Three piston rings are fitted, all of them being above the wristpin. The wristpin is fitted within a bossing in the piston casting and is solidly connected thereto. It does not oscillate with the connecting rod. The connecting rod is of I-beam section and is fitted at the crank extremity with a cap which covers the bearing and which is fastened by means of two bolts which pass through bosses on the cap and connecting rod.

The crankshaft runs upon three main bearings, those at the extremities being supported by the walls of the crankcase casting, while the central main bearing is carried upon a bridge which is formed by a web in the casting. The camshaft is located upon the right side of the motor and operates both the exhaust and inlet valve actions. The valve-lifter action is simplified by having the cams act directly upon the push rods, thereby doing away with the lifter and follower mechanism generally employed. The camshaft is also carried by three plain bearings of ample length, located at the ends and center of the shaft.

The valves are of two-piece construction, the stems working in the guides G. The springs S are long and of sufficient strength to secure positive valve action. The spring caps C are flanged in order to hold the springs firmly in place and eliminate noise to as great an extent as possible.

The crankcase of the motor is cast in two parts, the lower half being independent, while the upper half is integral with the cylinder and waterjacket castings. The two parts of the crankcase are fastened in the usual manner by means of bolts which pass through the flanges. A packing is placed between them, thus eliminating oil leaks.

The motor is cooled by water which is circulated by means of a centrifugal pump. The water passes through a square tube

radiator before being again circulated through the cooling system. The radiator is kept cool by means of a fan formed by the pitched blades of the flywheel. Easy circulation is maintained by means of the large waterjacketing space which is so arranged that it is not constricted at any point. The valve passages are also well cooled.

The carbureter is located on the right side of the motor, being supported by the intake manifold and the motor frame. The gasoline is fed to the carbureter through a straight pipe connection and flows by gravity. The tank is located behind the driver's seat and has a capacity of 7 gallons.

The motor is lubricated by the splash system, of which a good idea may be had from the illustration. The oil reservoir is contained in the lowest part of the crankcase and is shown at R, Fig. 2. The oil is put into the crankcase through the filler hole which is provided with a screen through which the oil must pass and which will remove any impurities or foreign matter from the supply. A gear pump which is actuated by the camshafts lifts the oil from the reservoir and places it in the upper part of the lower half of the crankcase. The splash troughs are located here and are shown at T.

An oil pocket is provided at P so that the central main bearing will receive an ample supply of oil. The oil is caught up in the pocket and then drains through the hole shown into the bearing bushing, which is thereby lubricated. The oil after having been used will drain back to the lower part of the crankcase by means of the overflow holes provided. It passes through a screen before reentering the pump to be sent through the system again. The capacity of the oil tank is 5 quarts.

The car is operated by friction drive with five speed changes. The power transmission is illustrated in Fig. 1, the shaft is continued past the flywheel and terminates at a point about amidships in a friction wheel. The other or driven member of the pair of friction wheels which characterizes this car is placed upon a transverse shaft which is carried upon bearings supported by the frame. The driven wheel rests upon a sleeve which can be shifted in a direction parallel to the axis of the shaft. When the perimeter of the driven member is in contact with the outermost circumference of the driving wheel, it is apparent that the maximum speed will be obtained. Variations in the speed may be had by shifting the driven wheel so that the point of contact between the two wheels is at different distances from the center of the driving member. Power is transmitted from the transverse shaft to the rear wheels by means of two chains, one on each side of the vehicle. The ratio of reduction of the power from the transverse shaft to the rear axle is 4 to 1.

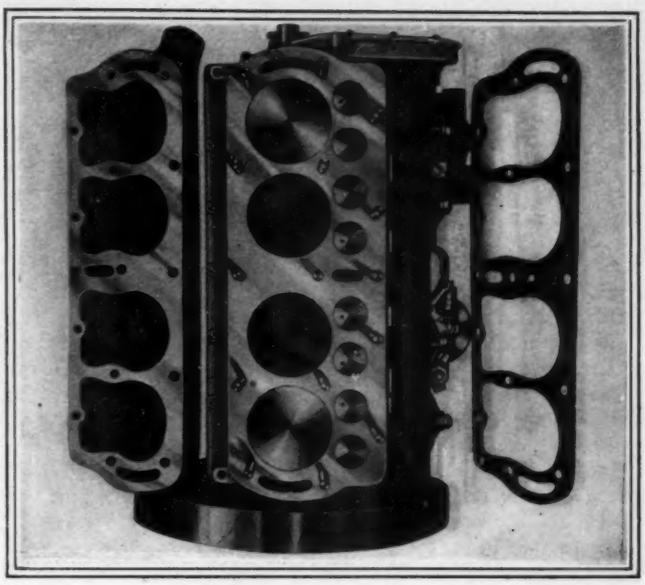


Fig. 3—Plan view of the en bloc cylinder casting on the Metz motor

The brakes are located at the wheel hubs and are of the disc type. They are controlled by pedal from the driver's seat.

The chassis is hung upon elliptic springs both front and rear; the rear springs consist of four plates and are 1 1-2 inches in width and 30 inches in span, the front springs have exactly the same dimensions and constructive details. The front axle is of drop-forged manufacture. The side members of the chassis frame are of channel section straight construction, having a depth of 3 inches and width of 1 1-4 inches.

The wheels are of the artillery type, each having 14 spokes, and being provided with Mott steel rims. The tire equipment regularly fitted consists of a full set of 30 x 3-inch tires.

The car is sold fully equipped with high-tension magneto, tires, tools and top, and complete weighs about 1,000 pounds. It is designed for two passengers.

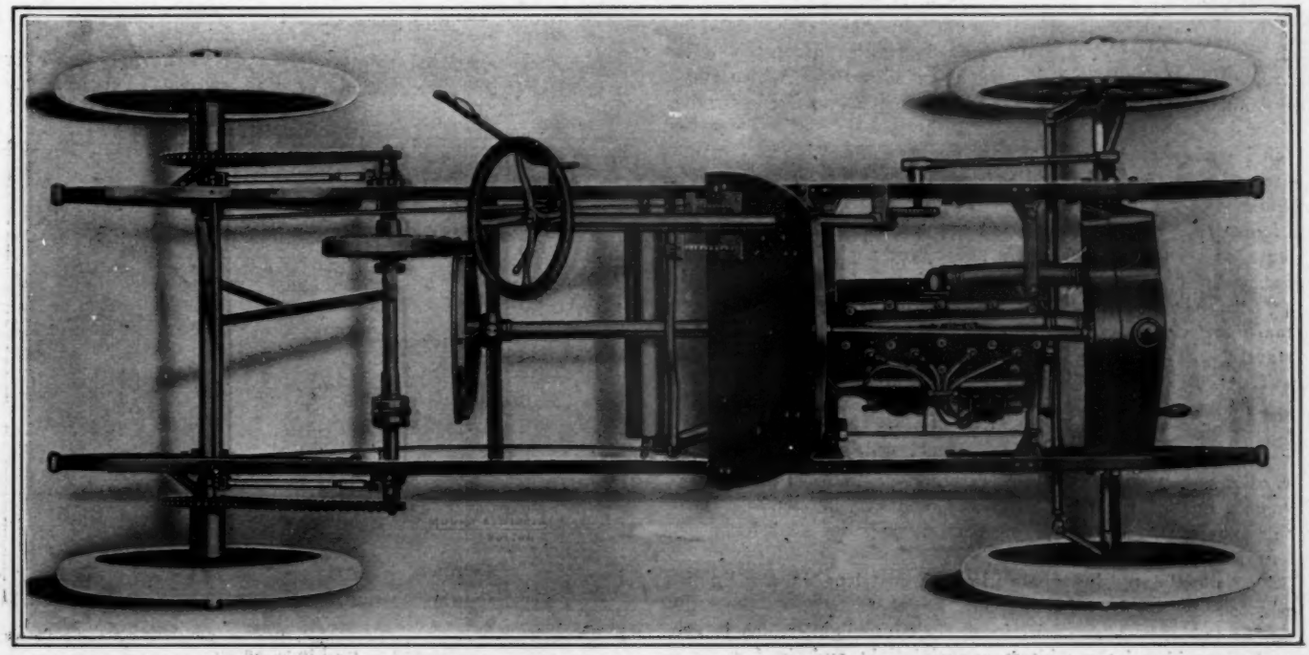


Fig. 4—Plan view of the standard Metz chassis, showing friction drive

Acetylene and Its Uses

ACETYLENE, as everyone knows, is generated when calcium carbide is brought into contact with water. Carbide is a compound consisting of calcium (a metal which may be burned to form lime) and carbon (the element used wherever heat is to be produced in commercial quantities). Calcium carbide, however, is not made directly from its elements, calcium and carbon. It is produced by heating, in the electric furnace, a mixture of lime (calcium oxide) and coal (carbon). In this process part of the coal combines with the oxygen of the lime and is freed as carbon dioxide, while the rest of the coal reacts with the calcium, resulting in the formation of calcium carbide. But this reaction takes place only at a very high temperature, and during the process vast quantities of electric energy are absorbed by the carbide and stored in a latent form of energy, generally referred to as chemical energy.

Owing to the low price of carbide, its production may be profitably carried on only where electric power is available at a low price, such as near a waterfall, and at places not too remote from the localities of carbide consumption.

If water is poured on calcium carbide the following reaction takes place: Water, which consists of hydrogen and oxygen, loses its oxygen content, which combines with the calcium and forms lime; the carbon of the carbide and the hydrogen of the water form acetylene gas, which has the formula C_2H_2. One pound of acetylene is composed of 12-13 pound of carbon and 1-13 pound of hydrogen, and contains about 17,500 B. T. U. This is a tremendous amount of energy, and since the lime by the formation of acetylene contains no more energy than it originally possessed this number of B. T. U. represents the total of the energy absorbed in the electric furnace. The usefulness of acetylene is founded upon this high energy content, which, however, is also a source of danger, especially so if impurities are taken up by the gas. If this is the case acetylene is liable to be decomposed into its elements, carbon and hydrogen, and the high energy content to be set free, causing a considerable detonation.

Pure acetylene has hardly any smell at all. The stench popularly ascribed to it is caused by the impurities often contained in it. The dangers accompanying impurities in acetylene are practically obviated by using the so-called autogas, which comes in tanks. Here the acetylene is dissolved in acetone, a by-product of wood-tar distillation. In filling the gas tanks, these are first filled with acetone, a gelatinous mass. Then the acetylene is pressed into the tanks and is readily absorbed by the acetone, which, under a pressure of 176 pounds per square inch, is capable of dissolving acetylene of a volume 300 times its own. In this state, acetylene is quite a safe substance; a platinum wire made incandescent in a hermetically sealed full tank fails to ignite or decompose the acetylene. Besides being explosion-safe, gas tanks are clean, economical and may be put in use almost instantly.

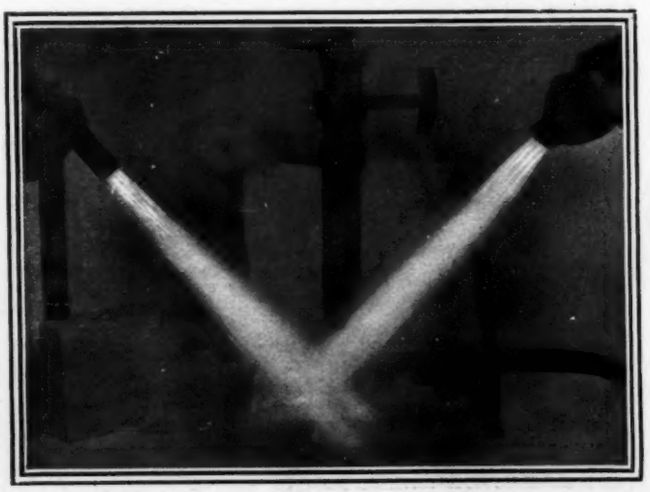
The acetylene emerging from gas tanks is pure and therefore less dangerous than the impure gas, when it comes in touch with copper pipes. Copper, as is well-known, is very apt to form verdigris if given a chance to combine with water and air, and verdigris, in turn, combines with acetylene to form acetylide of copper, one of the most explosive materials known. It is for this reason that copper piping should never be used for acetylene leads.

The most extensive application of acetylene is for lighting purposes. Acetylene has quickly found favor with the automobile public because of its intensely white light, which is generally considered the whitest artificial light and, in fact, is as white as sunlight. The cause of this phenomenon lies in the high energy content of the acetylene. The 17,500 B. T. U. contained in 1 pound of the gas develop a very high temperature—about 2,300 degrees Centigrade—if the gas is ignited. At this temperature carbon is white-hot, producing the purest white light there is. The high carbon content of acetylene, remembering that it constitutes 12-13 the weight of acetylene, accounts for the enormous quantity of white light produced by a very small flame. If a reason for the ability of carbon to produce a high temperature is sought it may be found in its black color. Black matter heats up much more rapidly than white material, and, just as in walking in the sun, a black coat seems much warmer than a white one, so coal, when it is heated, quickly attains a much higher temperature than silver or platinum, for instance. If a coal mark be made on a platinum sheet, and the sheet heated in a flame, the coal mark becomes white hot before the platinum heats up to red glow. The higher the temperature of the heated metal the more intense becomes the light radiated by the coal marks.

Likewise, in an acetylene flame the intensely white light is made possible only by the high temperature of the burning carbon. Superficial measurements of the heat of an acetylene flame in open air would indicate an average temperature of about 1000 degrees Centigrade. Numerous and detailed experiments, however, have revealed the fact that in the portions of the acetylene flame which radiate most of the light the temperature is about 2,300 degrees Centigrade.

Use of Generator Tanks Has Good Features

In place of the gas tanks in which acetylene is stored and transported many automobilists use generator tanks, containing calcium carbide, to which water is added when acetylene gas is required. Most generator types contain carbide, and in order to develop acetylene gas, water is permitted to drip upon the carbide. This process is simple but has many disadvantages, especially that the carbide ashes are apt to harden quickly in this process, which is accompanied by a waste of carbide. Furthermore, the material heats up quickly and part of the acetylene is decomposed immediately. A more advantageous manner of producing acetylene for use on a car would be to have the



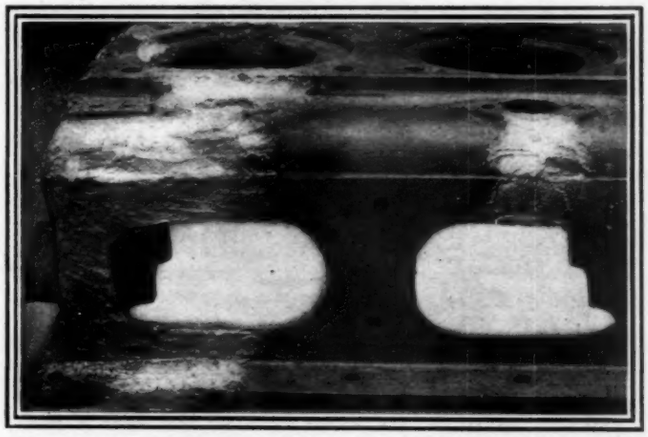
Where large portions are to be welded, two or more oxy-acetylene flames may be used to advantage

carbide grains drop into the water, whereby all the above setbacks would be avoided. But, since the construction of a generator of this type is more complicated than that of the water-on-carbide class, very little has so far been done along the carbide-in-water line despite the advantages of this system.

In order to prevent the freezing of the generator water in Winter, anti-freezing ingredients should be added, among which a small percentage of denatured alcohol is highly recommended. Salts dissolved in the water are apt to cause rust or verdigris on the gas fittings; this should always be avoided. A solution of sugar also has its good qualities, and, like the alcohol solution, reduces the violence of acetylene generation when water is admitted to the carbide.

Autogenous Welding Opens a Wide Field

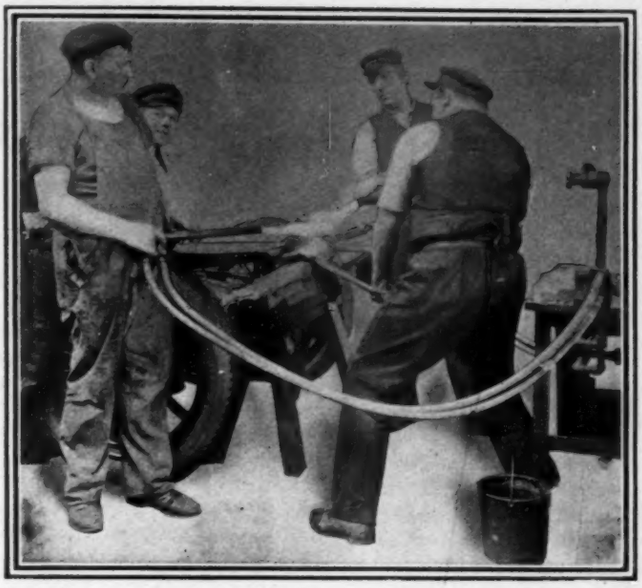
The most important application of acetylene, aside from illumination purposes, is for autogenous welding. Welding is a process of solidly joining two pieces of the same metal, without the use of a solder of a different material. Where common solders are used the work of uniting two pieces of metal may be done at a low temperature with a correspondingly low consumption of heat. But the strength of the union formed is also a low one, and where a strong metal member, such as a crankshaft, is broken and must be repaired, it is necessary to consider the fact that this part will have to do much work and is subject to great kinetic stresses. Therefore the repaired part must be made fully as strong as the unbroken portions, and to attain this end it must be welded.



How a broken crankcase is welded by the oxy-acetylene process, after which it is ready for finishing

The difference between the ordinary welding process and autogenous welding lies in the fact that the smith heats the parts to be welded until they get soft and then unites them by hammering, whereas in autogenous welding the portions adjacent to the fracture are brought together and heated to their melting point. The principal point in autogenous welding, therefore, is to produce a temperature in which iron—or the material to be welded—melts. In this case only the portions to be welded may be heated in a very short space of time and the job may be finished ere the neighboring portions begin to heat up. For this reason a very small acetylene flame may be used, this producing a high enough temperature over a small range.

The high conductivity of metals would not permit the flame to get hot enough to melt them if it were left to the flame suction to supply the air necessary to produce the high temperature above mentioned. For this reason compressed air, or rather oxygen, is led into the acetylene flame, causing a flame similar to that of the blow-torch. Oxygen is applied in preference to compressed air, since, if the latter is used, the 80 per cent. nitrogen contained in the air must be heated at the expense of the energy content of acetylene and oxygen. The best possible effect is obtained by mixing the two gases in a mixing chamber.



Executing an autogenous-welding job on an automobile. Two men handle a flame each and another assists

It may seem quite remarkable that this very explosive mixture of acetylene and oxygen does not fire back into the gas lead, which would result very seriously. The same point may be raised in connection with the use of a gasoline blow-torch. But the reason why this never happens is easily found. To make it possible for the flame to backfire into and ignite the mixture in the gas lead the velocity of the burning gases would have to be in excess of the speed with which the mixture is forced out of the nozzle. To avoid this the nozzle aperture is made so small that, together with the pressure of the mixture in the gas line, it fully balances the tendency of the flame to backfire. In addition to this, copper gauze screens are inserted in the gas pipe, so that should a flame find its way into the interior of the pipe it would instantly be cooled and extinguished.

The principle of autogenous welding seems to be simple enough, but the work is not so very easy, because the process requires more than that the fractured pieces be melted and pressed together. The repaired portion needs to be quite as strong as it was before fracture, or it will not be able to sustain the stresses imposed upon it. But the high temperature to which the metal is submitted may bring about some change or other in its chemical composition or structure, and therefore some skill is required to obtain the desired result.

Besides acetylene only hydrogen has been practically considered so far for the purposes of autogenous welding. But, at the present high prices of power, hydrogen cannot be produced as cheaply as acetylene, and it is troublesome to transport. The most common way of producing hydrogen is by treating zinc shavings with dilute sulphuric acid. Only recently a compound named hydrone has been placed on the market which, if it is brought into contact with water, develops hydrogen as carbide develops acetylene. This material seems to offer some possibilities of a more general use of hydrogen.

While it is acknowledged that hydrogen is still more combustible and therefore more dangerous than acetylene, the oxy-hydrogen flame utilizing a similar apparatus as the acetylene autogenous process has been perfected to practical usefulness. The same flame offers also great possibilities in respect to illumination. Limelight, so eagerly striven after by many, is produced by the point of an oxy-hydrogen flame heating a pivot of lime. The possibility of an adaptation of limelight illumination for automobile use is by no means a small one, and the system producing a limelight on as safe a basis as acetylene illumination stands on to-day, would no doubt find numerous motorists ready to adopt it.

Digest of the Leading Foreign Papers

Safety Starting Cranks--II.

THE French Society for the Prevention of Accidents to Workmen instituted a competition this year for designers of safety cranks, with a view to standardizing a method for avoiding the accidents now frequently caused by the involuntary reversal of a crank's direction of rotation, especially in the starting of automobiles and in the use of winches and hoisting apparatus. Three of the cranks submitted in this competition were described and illustrated in THE AUTOMOBILE of October 26. Three more are described herewith and illustrated in Figs. 1, 2 and 3.

In the crank designed by V. Morland the extension motor shaft is grooved at the end, and the keypiece B (consisting of the keypiece proper and a square shank with dog C), which is inserted in the back of the crank, engages the groove and carries the crank along when the position of the lockpiece D is such as to permit the spring R to press the keypiece home. To regulate the position of D it is provided with a stubshaft carrying a pawl, which, in conjunction with the stationary ratchet wheel G (which is fixed upon a sleeve in which the motor shaft extension rotates), prevents D from following when the crank is rotated in the wrong direction. By a very slight movement of the crank in the wrong direction the cam groove in D consequently throws the dog C upward, against the resistance of spring R, and, as C is part of keypiece B, thereby at the same time releases the crank from the motor shaft. In the drawing, Fig. 1, the cross-section taken along dotted line *aa* is seen from the motor side, and the pawl is shown in dotted lines. It is seen that not only the reversal of the motor shaft, but the reversal of the crank as well, releases the latter, and this feature enables the operator to place the crank in the suitable "twenty-five minutes to" position for a starting movement in every instance. (The description and also the drawing of the Morland crank, as given in *Bulletin Officiel*, seem inconsistent with true mechanics at several points, and both have here been modified somewhat, so as to represent the principle of the crank correctly, as it must be.)

A crank designed by Louis Royer consists of a crankhub 1, 2, 3, 4, of which 1 is smoothly cylindrical and forms the bearing for a sleeve A provided with the customary clutch arrangement for gripping the motor shaft and at its front end formed with a conical surface K. Part 2 is formed with a square thread of steep pitch engaging a correspondingly threaded sleeve formed exteriorily as a ratchet wheel and provided at its rear end with a conical surface F adapted to form a clutch with the hollow cone K. Part 3 is screw-threaded to secure the flanged nut D, which serves as abutment for spring C, the latter exerting a pressure upon the end of the ratchet sleeve, acting through the medium of a ball bearing. To part 4 the crank handle M is secured. The crank is shown in the drawing as one to be turned "against the clock" for starting the motor. The combined pawl and lock bolt T, when let down upon the ratchet sleeve behind the ratchet teeth, prevents any engagement of the crankhub with the motor shaft. To start the motor T is raised by hand and dropped into engagement with the ratchet teeth, the crank mechanism being at the same time shoved back, against the resistance of spring U, to engage the motor shaft. When the crank is turned in the right direction the thread of part 2 forces the ratchet sleeve into driving engagement with the sleeve A, while T, now acting as pawl, slips over the ratchet teeth. If the motor shaft is turned in the opposite direction,

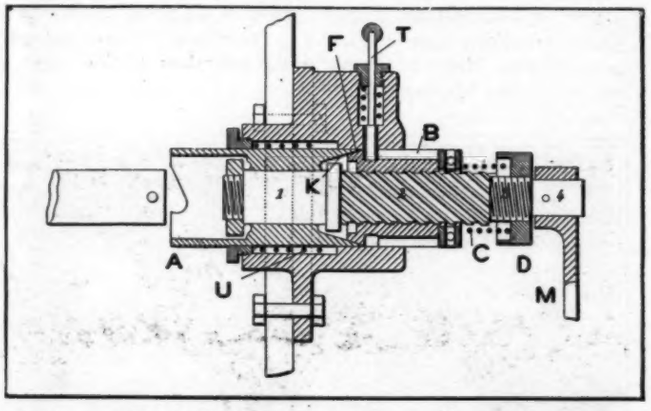


Fig. 2—The Louis Royer safety starting crank

any incipient reverse movement of the crankhub makes the pawl stop the ratchet sleeve, while the action of the steep thread draws the conical surfaces apart and releases the crank mechanism, excepting sleeve A. (It seems, however, that pawl T may be in a position in immediate proximity to the stop face of a ratchet tooth, when the reverse action begins, which will leave scant chance for any rotary action to release the cone clutch.) The spring C is intended for pressing the ratchet sleeve forward on the steep thread sufficiently for avoiding lost motion in bringing the cone clutch into engagement, but not sufficiently for a working engagement.

The Duperron crank is of pleasing simplicity. To get the clutch B in engagement with the motor shaft A at the pin D, the pin G on the crank axle must engage sleeve E, which carries a ratchet wheel R, upon which acts pawl F, itself pivoted in the fixed plate S secured to the chassis. If the motor kicks back, the ratchet wheel is stopped by the pawl and the oblique edge in the clutch notch of sleeve E throws the crank out of engagement with the motor shaft. To make sure, the notch in E is deeper than that (or those) in B.

In the competitive trials of the cranks, prizes of 300 francs each were awarded for the Clemencet, the Duperron and the Morland cranks, but none of them was considered all that could be desired. Honorable mention was accorded for the other cranks here described.—From *Bulletin Officiel*, September.

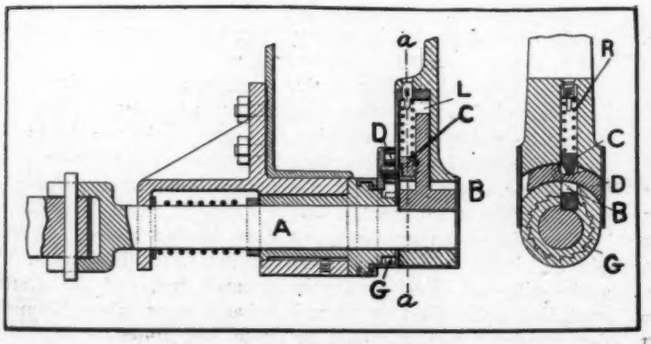


Fig. 1—The Morland safety crank, longitudinal section and cross-section on line *aa*.

FORCE-FEED SPLASH OILING FOR CHEAP CARS—The system has been tried out during the past two years and found good. The lower part of the sump (which is the rather expressive term

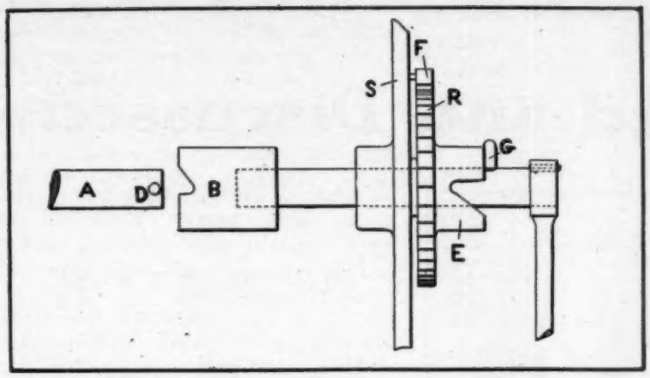


Fig. 3—Side View of Duperron Safety Starting Crank

used in Great Britain for the lower half of the crankcase) forms the oil reservoir, and at the bottom of it a pump is mounted horizontally and driven by a worm machined upon the camshaft, which meshes with a helicoidal gear upon the pump body. The pump drives the oil through a tube to a collector, from which it is distributed under the pump pressure to the crankshaft and camshaft bearings. Under each of the connecting rods there is formed a saucer into which drains the surplus oil from the crankshaft oil channels, and each connecting-rod knuckle carries a little cup which dips into the corresponding saucer at the bottom of the stroke, picking up a determined quantity, which rises to the connecting-rod bushing through holes provided for this purpose. With an ample discharge from the pump, the system evidently has the advantage of a constant level splash feed, being independent of the oil level until the same gets so low as to rob the pump of its supply, and it seems to have the additional virtue of being sparing in the quantity of oil which it sends to the cylinder walls and to the piston pin. An oil-circulation indicator on the dash secures the pump supply.—From description of La Buire car in *La Pratique Automobile*, October 25.

WIRE AND WOOD WHEELS—The superior strength, at equal weights, of the wire wheel over the wood wheel does not depend, according to the Rudge-Whitworth company—whose detachable wire wheels are gaining much ground in Europe—upon the intrinsic properties of steel in comparison with other materials on a weight basis, but almost solely upon the fact that the steel, with its much higher density, takes up much less space for a given strength and therefore may be applied to the suspension design of wheels which, on the other hand, is impracticable with the more bulky materials. The suspension wheel, in which the rim is in compression and the many spokes in tension, is a far more efficient design, says the firm, than the artillery wheel in which the relatively few spokes are in compression and subject to bending strains and the rim is in tension. Owing to the crossing of spokes and the very large joints which would be required, a wood wheel built on the suspension principle would be ten times as broad as a wire-spoked suspension wheel of the same load carrying capacity. The point in understanding raised by the firm is illustrated in the accompanying table.

STRENGTH IN POUNDS OF WHEEL MATERIALS.

	Weight of one cubic foot.	Elastic limit, pounds per square inch	Tensile strength, pounds per square inch.	Breaking pull of piece 1 foot long weighing 1 pound.	Elastic limit of piece 1 foot weighing 1 pound.
Steel spokes	490	135,000	157,000	46,140	39,680
Aluminum, 97½ per cent. alloy rolled	170	15,000	26,000	22,030	12,710
Hickory, American average	50	11,200	19,600	56,450	32,250
Ash, American	39	7,900	17,000	62,760	29,170
Oak, white	50	9,600	13,600	39,170	27,650

—From *The Car*, October 15.

Harking Back a Decade

FROM *The Motor Review* November 21, 1901:

Henri Fournier is planning to establish a factory in the United States to make a racing machine under patents of his own. The capital is said to have been promised by Foxhall Keene and other New York millionaires.

The withdrawal of the Apperson brothers from the Haynes-Apperson Company means that an entirely new type of automobile for four passengers and equipped with tonneaus exclusively will be made by the former.

The I. A. Weston Company, of Syracuse, N. Y., has purchased the entire plant of the Jamesville Manufacturing Company and will make automobile axles and other steel parts for motor cars and horse-drawn vehicles.

At the coming South Carolina and West Indies Exposition, which opens at Charleston December 1, there will be a large display of automobiles. The Wagener Driving Park course will be used for motor racing and demonstration.

The H. H. Franklin Manufacturing Company, of Syracuse, will be reincorporated shortly with an increase in capitalization from $100,000 to $250,000. It is intended to commence the manufacture of motor vehicles at once.

As was done at the New York automobile show, the track at the Coliseum, Chicago, will be abandoned this year. The pressure for space was so strong that the 7,000 square feet formerly used for a track will be divided into show spaces.

Alden L. McMurtry, with his new 16-horsepower Packard, weighing 3,600 pounds, recently climbed the Buena Vista street hill in Pittsburgh, a feat never accomplished heretofore with a motor vehicle.

The Knox Automobile Company announces that it took enough orders at the recent show to keep the factory busy for a month. Next week, it is announced, day and night shifts will be installed to fill orders and prepare stock for next summer.

Constant Huret, a well-known French chauffeur, has been arrested in Paris for abducting a gendarme and exceeding the speed limit. It appears that M. Huret stopped his automobile in the Bois de Boulogne and an officer stepped aboard to caution him about speeding. Huret dropped in his clutch and carried the minion of the French law several miles before obeying his orders to go to the police station.

Henri Fournier, driving a Mors racer, broke the world's mile straightaway record last week on the Ocean Parkway, Long Island, making the distance in 51 4-5 seconds. This is 5 1-5 seconds faster than the best time ever made for that distance even in France. The circular track mile record made by Alexander Winton in a Winton still stands at 1:06 2-5.

The timing was done by stretching a rubber hose across the starting line. Inside the hose were two strips of copper and the passage of a contesting car was supposed to press the two copper surfaces together, thus closing an electrical circuit. The impulse given by this was intended to convey a flash to the finishing line. On paper it seemed reasonable, but in practice it failed dismally.—*Editorial.*

The Stearns Steam Carriage Company, of Syracuse, announces that it is putting out twenty-five more traps of the latest design. These cars are equipped with a new gasoline generator which makes possible the use of a low-grade gasoline and will generate 150 pounds of steam from cold water in 10 minutes.

Letters Answered and Discussed

Adjusting Worn Valves

EDITOR THE AUTOMOBILE:

[2,917]—I have had the valves on my car ground often, taking it altogether, as my car is very old. I am sure that the valve timing has become affected owing to the number of times this has been done. Is there any way of compensating for this change in the valve position? J. R. C.

White Plains, N. Y.

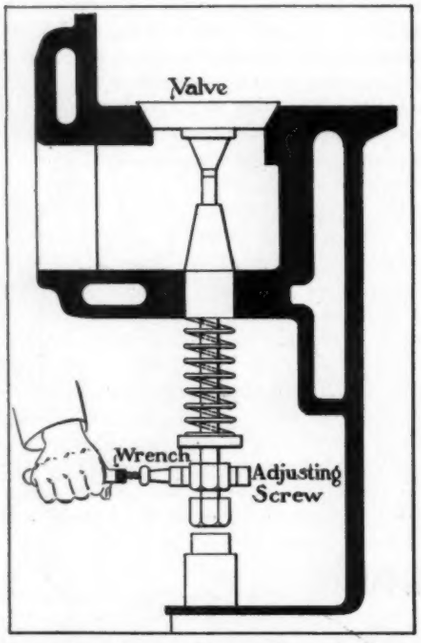


Fig. 1—Showing method of making adjustments on worn valves

In grinding down the valves the total strength is decreased by the amount that the depth of the valve is reduced by the grinding. This may be compensated for by making the adjustment shown in Fig. 1. The nut shown is turned and the length of the stem increased.

Leave Breather Pipe Open

Editor THE AUTOMOBILE:

[2,918]—Will you kindly answer the following queries through the columns of your paper:

(1) Is there any chemical less expensive and with which there is less evaporation than alcohol, which might be put in the radiator to prevent freezing?

(2) I have fitted a funnel with a tight lid on it to the breather pipe opening of my four-cylinder motor in order to keep the dirt out and for convenience in pouring in oil. Should this breather pipe be left open for any reason? E. C. N.

Juniata, Pa.

The Editor invites subscribers to communicate their automobile troubles and personal experiences, stating them clearly on one side of the paper. If the nature of the case permits, send a sketch, even if it be rough, in order to assist to a clearer understanding. Each communication will receive attention in the order of its receipt, if the writer's signature and address accompany it as an evidence of good faith. If the writer objects to the publication of his name, he may add a nom de plume.

(1) Glycerine is used extensively to make an anti-freezing solution. The proper amount of it to add to the cooling water should be determined by the local weather conditions. The following table gives the freezing points of glycerine solutions:

10 per cent. glycerine freezes at	30 degrees F.
20 per cent. glycerine freezes at	27 degrees F.
30 per cent. glycerine freezes at	21 degrees F.
40 per cent. glycerine freezes at	0 degrees F.
50 per cent. glycerine freezes at	−25 degrees F.

(2) The function of the breather pipe is to relieve any compression which may be produced in the crankcase, and obviously it should not be closed. The end of this pipe is usually covered with a wire gauze to prevent dirt from getting into the crankcase, and if you put oil into the latter through this pipe, you can fit a funnel to it which has a strainer inside.

Testing Magneto with Bell

Editor THE AUTOMOBILE:

[2,919]—I would greatly appreciate it if you could give me a little information on the ignition system of my Ford Model T car. I wish to test the coils and would like to use a common magneto bell such as I use for testing for grounds and open circuits in electric lines.

If the coils are in good order, how should they act in connection with the magneto bell and how should the same be connected to the coils? J. L.

Mellen, Wis.

The bell may be readily used to test the magneto coils. The manner in which it should be connected is as follows: Remove the contact spring and place one end of bell circuit at contact point and the other on different parts of the engine frame, which is grounded; if the bell rings, the coil is all right insofar as the wire therein is concerned, and will then have to be tested for short circuit. This test is made by removing the magnetic field and coils and connecting the bell circuit to the contact point and then to the plate by means of which the circuit is grounded to the engine frame. If the bell rings when contact is made, there is a short circuit in existence which will have to be found and eliminated.

Misses When Speeded Up

Editor THE AUTOMOBILE:

[2,920]—I am very much troubled with my engine, which misfires when speeded up beyond 12 miles per hour on the high speed. I blamed the carbureter at first, but after cleaning and adjusting it and examining the whole gasoline line I am convinced that the trouble lies in the ignition system. At the same time I cannot see how it will work at low speeds and not at high. Can you help me out?

ALEXANDER CARROS.

Pueblo, N. M.

Examine the timer to see if it is worn, if not, your vibrator is not correctly adjusted. To remedy this, turn the screw on the outside of the coil box until the trembler gives a good clear humming sound at all speeds. The manner of making the adjustment is illustrated in Fig. 2.

Regarding Reverse Ratio

Editor THE AUTOMOBILE:

[2,921]—Would like to have the question of reverse gear ratios aired a little. In several cases, if I am not mistaken, the reverse gear ratio is about the same as the intermediate ratio forward. Now I have always taken it for granted that the reverse should be even lower than the lowest forward speed to allow of the same turning effect to reach the rear wheels through the less efficient reverse gearing as through the low speeds forward, thus enabling the car to be maneuvered into or

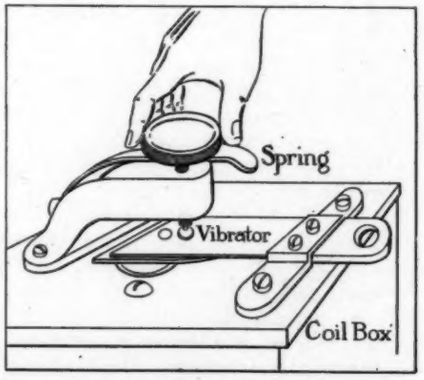


Fig. 2—A badly adjusted vibrator is often responsible for an elusive miss

out of any situation desired. I did not know there was any need of any higher speed in the reverse than the common ratio provided. A. D. KELLOG.

Eureka, Cal.

If there is any gasoline car manufactured whose reverse speed is higher than the lowest forward speed, it has not become known to us.

Likes Kerosene Idea

Editor THE AUTOMOBILE:

[2,922]—Your answer to question 2895, issue of October 2, relative to using kerosene in the radiator of the automobile in place of water would seem to indicate that there would be no permanent injury to the cylinders or motor from the use of kerosene in place of water. Now if this be true, why not use kerosene in cold weather in place of alcohol when it is possible to purchase it for the small price of 6 or 7 cents per gallon, where alcohol is so much more expensive?

It seems to me that it would be much cheaper to use kerosene in cold weather unless there is some injurious result to offset the difference. Kindly give a little light on the subject and greatly oblige a constant reader of your magazine.

FRANK CONE.

Findlay, O.

So far as can be seen without actually trying the experiment there should be no deleterious effects arising from the use of kerosene beyond the fact that the engine would heat up, unless the weather were very cold, owing to the low specific heat of the kerosene. In a climate where the days are warm and the nights cold, as is often the case at this season of the year, kerosene would probably not cool the engine as well as it should during the middle of the day.

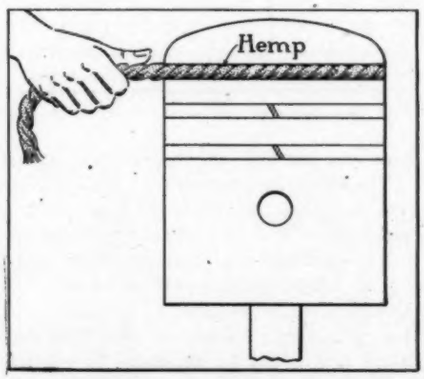


Fig. 3—The life of piston rings may be prolonged by the use of hemp

The freezing point of kerosene is rather uncertain, and if you have experimented in this direction sufficiently to obtain definite and satisfactory results, the scheme you suggest may be tried with success in very cold weather. Kerosene will certainly not affect the metallic parts.

Wants A. L. A. M. Formula

Editor THE AUTOMOBILE:

[2,923]—Would you kindly inform me the method used to rate the horsepower of gas engines given by the A. L. A. M.

RALPH G. HISSEY.

Cape Cottage, Me.

The A. L. A. M. formula is as follows: $\frac{D^2 N}{2.5}$ where D is the diameter of the cylinder and N is the number of cylinders.

Using Worn Piston Rings

Editor THE AUTOMOBILE:

[2,924]—I believe I read somewhere that it would be possible to use worn piston rings for a time by inserting something beneath them to hold them out. Could you tell me how this is done?

OLD SUBSCRIBER.

Tenafly, N. J.

It has been done by inserting a small winding of hemp twine in the ring aperture. The winding of hemp is placed in the groove as shown in Fig. 3 and the ring placed back over it. The ends of the ring will be spread a little farther apart than formerly as seen in Fig. 4. This will hold for several months if properly done.

Has Elusive Misfire

Editor THE AUTOMOBILE:

[2,925]—I have a 40-horsepower car which I have driven until recently without experiencing any ignition troubles. Now, however, the engine has started misfiring. I have ground in all the valves, both intake and exhaust, and have had the cylinders off and cleaned the carbon out but without effect. The wiring has also all been completely examined in the hopes of locating the miss, but without success. The motor does not seem to misfire so much when running light and in the first and second speeds, but as soon as I go into high it will miss considerably.

At other times, when in high speed it will run 20 miles without a single miss. I am using dry batteries for ignition purposes, six cells connected in series. I am sure it is not due to the batteries, however, as the same thing occurs when I am using new batteries. Anything you may suggest which might help will be greatly appreciated by me. L. P. BEERY.

Thurston, O.

An elusive misfire is often due to the fact that the rotor of the timer has become loose on its shaft and changes its relative position. The misfiring is often accompanied by preignition and backfiring when this is the cause of the trouble. The spark plug may be sooty. Induction coil troubles are often responsible for just such a condition; there may be dirt between the contact points, the contact points may be loose, the connections within the coil box may be loose or the insulation within the coil box may be defective. The timer is often unsuspected when it is the seat of trouble; for instance, the contact points may be dirty, bad contact on account of worn or dirty parts may be found, or the shaft may not have good contact with the metal of the motor owing to the presence of a film of grease which partially insulates the shaft.

The battery cells will often shake about in such a manner that the electric connections between them are severed or at least rendered very uncertain. In this case it often happens that an irregular misfire is often developed. It is in this latter that the source of trouble will most likely be found. If these fail, carefully examine the carbureter for dirt.

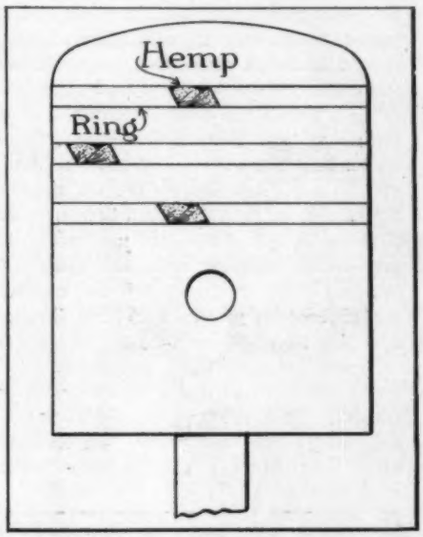


Fig. 4—Showing the appearance of the piston after the hemp is inserted

Query About Carbureters

Editor THE AUTOMOBILE:

[2,926]—I have a 25-horsepower car, and it may be all right, but I cannot help tinkering with the carbureter, which does not seem to be capable of giving satisfaction. I have had the obstinate thing treated by a repairman, but this has made things no better, and I am tired of it.

I have heard about several types of automatic carbureters, and I understand that these have a fixed nozzle opening, thus protecting the most delicate portion of the ravings of the driver. Where can I get a description of an up-to-date automatic carbureter?

Port Jervis, N. Y. WM. J. NUTTY.

On p. 822 of the issue of Nov. 9 is described an automatic type of carbureter, in which a fixed gasoline inlet is used, while the air supply varies with the demand of the motor. Another type of automatic carbureter was described in THE AUTOMOBILE of August 17.

Little Bits of Motor Wisdom

Tools and Other Devices Useful to Repairman and Driver

USING DIFFERENTIAL PULLEYS—Few of the smaller garages and repair shops realize the importance of the pulley system illustrated in Fig. 1 as a labor saver. Its principal use, as far as the repairman is concerned, is in connection with the removal of the motor from the chassis. Every garage should have a special place for such work to be done, and a heavy wrought iron hook or loop should be securely fastened in the ceiling at this point for the purpose of suspending the pulleys. When the nature of the repair necessitates the taking down of the motor, the car should be run to this particular part of the shop, and after taking out the holding bolts and other connections with the body of the machine, the differential pulleys should be brought into play to lift the motor onto the "horse" or bench provided for the purpose.

A good form of motor "horse," and one which is used by some of the larger repair shops, has two small wheels fixed to two of its legs, with handles at the other end. After placing a motor on it, it is wheeled to a lighter and more convenient place. In making the finer motor adjustments it is advisable to have as much daylight as possible, since better results can be expected from the mechanic who has a light and properly ventilated place to work. Very often a dull, besmeared incandescent lamp furnishes the only light the workman has at his command, and small wonder is it that with such facilities a motor which calls for accurate repair frequently leaves the shop practically in worse shape than when it entered.

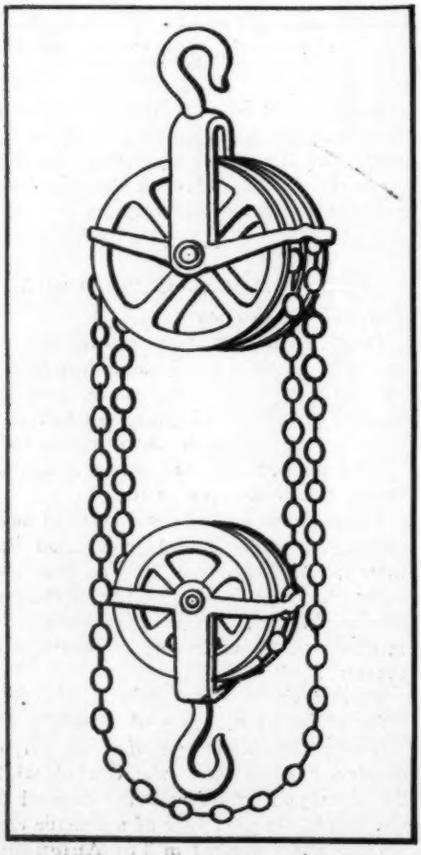


Fig. 1—Differential pulleys for lifting motors and other heavy parts

NUT LOCKING DEVICES.—Most motorists are familiar with the various methods in vogue for securing nuts on their bolt-ends so that the jarring and vibration to which they are subjected will not cause them to work loose or be lost. Sometimes two nuts are used, jamming against one another and locking in this way, the smaller or check nut being placed under the thicker regular one. This is not so good as the use of cotter pins, which are put through holes drilled in the ends of the bolts, and their ends spread to prevent their slipping out. This fastening prevents the loss of the nut, but does not do away with its tendency to turn.

Castellated nuts are used extensively for automobile work, and they afford the best method of fastening, since turning and loosening are both prevented. Fig. 2 shows the nut A with the cotter-pin C passing through the end of the bolt B. Diagonal slots are cut in the top of the nut, and the cotter rests in one of them. Of course, one of the slots must register with the drilled hole in the end of the bolt before the cotter can be put in place. Whenever possible, it is best to use this form of fastening.

REQUIREMENTS OF A GOOD CLUTCH—The life of a car is entirely in the hands of its driver. To prolong the life of the car is or should be the object of every driver, and to do this few things are so important as the proper manipulation of the clutch. A clutch should engage gradually; that is, it should not take up with a jerk, but should impart the motion of the motor to the car gradually, so that there are no undue strains upon the driving mechanism. It often happens also with a fierce clutch that the weight of the car is suddenly thrown upon the engine while it is running slowly, and the inertia is sufficient to stop the motor. A feature of a good clutch which may be said to be second in importance after gradual engagement is that it should disengage almost instantaneously so that there will be no drag.

The clutch generally performs its work by friction, hence a large surface is a beneficial feature inasmuch as the friction depends directly upon the area of contact between the surfaces. It is evident that if the surface is not large enough the clutch will slip, or, if it does not slip, a greater strain will be put on each unit of its surface and the life will be much shortened.

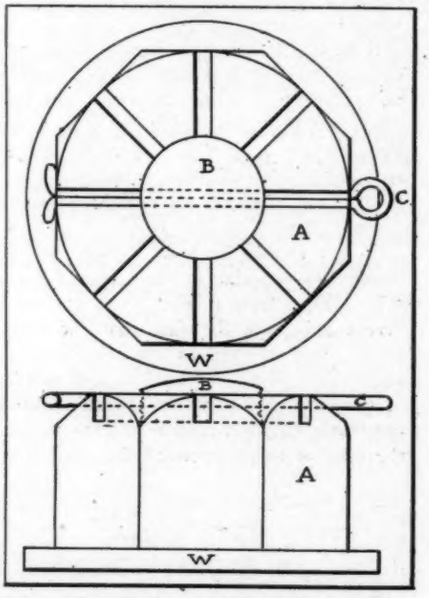


Fig. 2—Castellated nut with cotter-pin in place

The other requirements of a good clutch are the same as those of any piece of mechanism; that is, it should be capable of being inspected for wear or other defects in as simple a manner as possible. It should also be capable of adjustment so that if a slight amount of wear has taken place it will not be necessary to purchase an entirely new part, but that compensation may be made for any wear that does take place. The clutch should be simply and substantially constructed so that there is as little to get out of order as possible.

The friction member is sure to need replacement after the clutch has been in use for some time, and for this reason it should be placed upon the clutch in such a manner that it is very readily removed and refitted without disturbing any of the other parts. These requirements are for any of the friction clutches.

PLIERS OF DIFFERENT TYPES.—There are few who have not some type of wire pliers in the tool kit of their machine. It is doubtless well known that these tools are made in different styles to suit the different purposes for which pliers are used. In Fig. 3 are illustrated four different types of pliers which are of use to the automobilist who finds it necessary at times to perform some work about the electric wiring on his car.

The type numbered 1 in the illustration is about as familiar as any of the varieties of this most useful tool, and is so shaped that it is possible to obtain a firm hold upon the wire and at the same time, if so desired, the wire may be bent back and forth with pliers so that it is broken off at the edge of the tool. If it is desired to coil the wire for a short distance the wire is held in the pliers and they are turned around in the hand. This will produce a spiral in the wire.

The pliers shown at 2 are of entirely different shape, being so arranged that the wire will pass through the corrugated opening. The corrugations are arranged at such a distance apart that when the pliers are closed over the wire a very firm bite will result. In case it is desired to break the wire, all that it is necessary to do is to take hold of the wire with the end of the pliers instead of simply allowing the wire to pass through the corrugated teeth. The wire is then bent back and forth in the same manner as described for the flat pliers. A form of the tool somewhat similar to the type shown at 2 is illustrated at 3, the difference lying mainly in the blunt end.

The corrugations are also a feature of the pliers illustrated at 4; in this case, however, there are two sets of teeth to allow of the pliers being used with different sizes of wire. To break the wire the process is the same, consisting of seizing the wire in the end of the pliers and bending it until the break is made. If one of these varieties is chosen to have a place in the repair kit it will be sufficient, as any of the types may be used with entire satisfaction, although a combined cutter and plier would be even better.

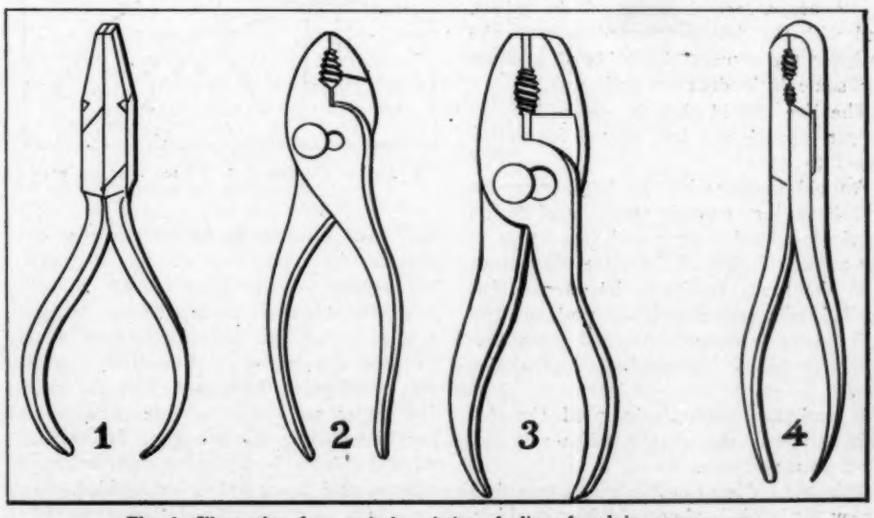


Fig. 3—Illustrating four typical varieties of pliers found in common use

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HEADS OF DIFFERENT SHAPE.—Bolts, studs and screws are made with heads of different shape to accommodate them to the various usages to which they are to be put. In choosing the head required for different purposes, strength, weight, cost and appearance are all factors, but the governing feature which should determine the matter lies in the requirement of accessibility and convenience. There are many places about an automobile engine, for instance, where it is impossible to go with a wrench and yet a screwdriver could reach the desired spot very easily. In many cases of this kind where a bolt has been made use of, a slot can be put in the head to take the screwdriver should it suit the convenience of the operator.

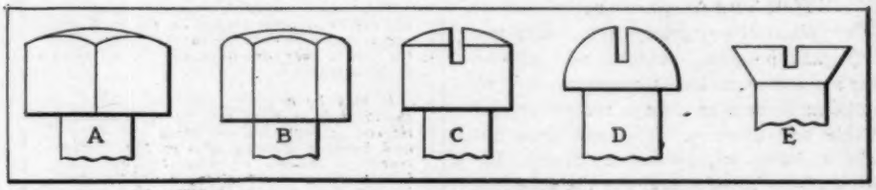


Fig. 4—Bolt, stud and screw heads are of various forms for different purposes

In Fig. 4 are shown five different types of heads used in connection with bolts, studs and screws. These five different types offer a wide enough choice to fulfill the requirements for convenience and appearance in any circumstances which may arise.

The head shown at A is square and may be used in connection with either a through-bolt or a stud. It has the advantage that the wrench is not prone to slip around it and wear the nut into a circle. This advantage is particularly felt in the smaller sizes of nuts where it is possible, by attempting to turn the nut with a wrench which is slightly too large, to spoil it to such an extent that it is exceedingly difficult to remove it at all. It is a great mistake to attempt to remove a nut with an over-sized wrench, since it is always possible, by the insertion of a flat piece of metal between the wrench and the nut to secure the same turning effect as if the wrench were the correct size, and at the same time none of the evils of a wrench which is too large are felt.

The hexagonal head is shown at B, and is common enough to need but few words to describe it. It has the great advantage that it is always turned in such a manner that it is possible to put the wrench over it to either tighten or loosen it. This advantage is not always possessed by the square head, as this may be turned in such a way that it is impossible to reach it with a wrench owing to the cramped surroundings. In such cases, however, even the hexagonal head will be found rather difficult to get at and the swings which can be made with the wrench will be so small that the operation of turning the nut will be both arduous and long.

It is in a case of the latter kind that the flat-headed machine screw is called into use, that is if the size of the stud be not over ½ inch. Where this head is used it is generally found that the metal is countersunk so that the head of the screw is just flush with the outside of the metal. This serves to give a neat appearance and a very workmanlike job. A screwdriver is a much better instrument for reaching inaccessible spots than is a wrench of any type, and it is for this reason that these screws should be used where the space prohibits the convenient use of nuts.

Where the head of the screw is to remain outside the surface of the metal, that is in cases where a countersunk head is not permissible, a better appearance is given the work by employing the round-headed screw as shown at D. The difference between this and the countersunk head screw lies merely in the appearance, the usages being the same. The head shown in the illustration at E is used almost entirely for wood-working operations. The countersink is for the purpose of improving the appearance of the finished work. In very fine work where the best possible appearance is made an aim the countersink is made extra deep so that the screws may be sunk considerably below the surface level, and then a plug of wood similar to the rest of the work is placed over it.

My Best Automobile Repair

Some Quick Repairs Made in the Garage and on the Road

Using Old Casings

EDITOR THE AUTOMOBILE:

When the ordinary automobile tire has pounded, skidded and ground over about 3,000 miles of common roads its condition insures an almost endless run of trouble and expense. The tire does not seem so badly worn that one feels justified in throwing it away, yet the frequent repairs together with the number of ruined inner tubes, and the consequent damage to one's moral character, certainly make it a paying proposition.

There is one way to get one-half as much more wear out of such casings without any expense to speak of. But in order to do this the plan which I am about to describe must be followed to the letter or results will not be satisfactory.

The plan consists in using one partially worn casing for a tread for another worn casing of the same size.

The casing which has the least rim cuts and injury near the beads should be selected for the inner one, and the one with the best tread should be selected for the outer.

If there are any breaks or holes in the

Fig. 1.—Depicting the operation of cutting the bead from the tire casing

fabric of the casing which is to be attached to the rim, they should be fairly well re-inforced with rubberized canvas inside patches, so as to offer a smooth surface to the inner tube.

The outside of this casing should then be well cleaned with gasolene, using an ordinary scrubbing brush and soft cloth for the work.

The old casing to be used for a tread should then be cleaned with gasolene on the inside, and the beads be cut off with a sharp knife.

Temporary automobile repairs made by the driver or owner while on the road and permanent repairs made in the garage after the run is over, are interesting to all automobile owners.

It may be a spring leaf has broken; a shackle bolt or strap may break; a steering tie rod is bent; the car skids into a curb and bends a steering arm or the starting crank; a throttle or magneto connection breaks owing to vibration; a radiator leak is started by a stone or some other means; a leak in the gasoline tank is discovered; there is a small hole in the gasoline feed line; a brake facing may burn out; a brake connection breaks; a front axle gets slightly sprung; a clutch starts slipping, or any one of a thousand things may happen.

Every automobile owner is interested in knowing how repairs have been made, how long it took to make them, how much they cost, and by whom they were made.

We want you to write in simple language in a letter what repair of this nature you have had to make, how you made it, how long it took you and how much it cost.

You can make with your lead pencil one or two rough sketches indicating the broken or damaged part and showing how the repair was made.

The experience of each reader is interesting to every other reader. Analyse your past experiences and send in one or two of them.

Give your name and address, legibly written. If you do not want your name to appear, make use of a nom de plume.

Editor THE AUTOMOBILE.

With the other casing on the rim, but deflated, the tread casing is worked on over the surface, using an ordinary tire tool as a lever.

After it has been adjusted evenly in place, vulcanizing cement, in quantities of about one teaspoonful for each place, should be poured between the casings opposite every second spoke of the wheel, and with the fingers inserted between the casings; the cement should be distributed for some little distance each way.

The tire should then be pumped up to proper capacity and left unused for twelve hours to dry.

An old casing with the beads removed will have just enough elastic give to its fabric to afford a snug and supporting fit for another casing of the same dimensions with the beads retained. The tread thus applied will cost practically nothing, and will give a resistance to road wear that will fully equal half the value of a new tire.

It makes a particularly good tire for Winter use, as the tread is wider and flatter than a new tire.

It is less liable to ordinary puncture than a new tire, as it is almost double the thickness on the tread.

A good plan is to get new tires of 1-2-inch extra diameter for rear wheels, and use the old rear casings to re-tread the front tires.

In the Winter, when repairing tires and tubes on the road is anything but pleasant, this arrangement gives satisfactory results.

One thing should be remembered in connection with old casings. The beads, whether clincher or Dunlop style, stretch a little in use, and the effect is to render "pinching" of the inner tube much more frequent than with new tires. This fact calls for greater care in having good protecting strips between the tube and rim.

An old inner tube which has been slit around its periphery and the valve removed will make a first-class protecting strip to prevent pinching.

The life length of a casing depends largely upon the firm adhesion of the fabrics to each other. When a tire is run not properly inflated the hinge-like bending of the fabrics is much greater than when pumped up to the proper pressure, and this constant bending tends to separate the fabrics and weaken the casing.

A little careful observation will enable a driver to tell at once when a tire goes

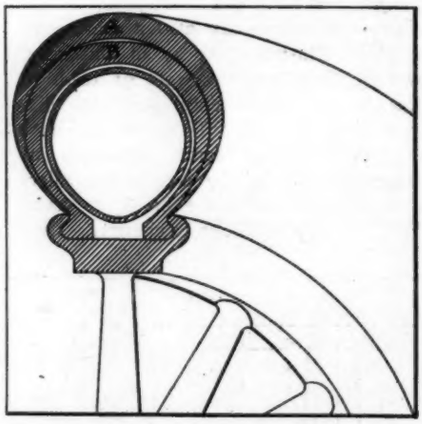


Fig. 2—The old casing A is fitted over the casing B in this manner

flat. And running on flat tires is very expensive.

The level of the front of the car will vary when one of the front tires deflates, and there will be a loss of speed when the rear tire lets go. If particular attention is given to these two ideas any careful driver will soon be able to stop his car immediately the tire goes flat on any wheel, and much expensive destruction of casings and inner tubes be avoided.

A. D. HARD, M. A.

Marshall, Minn.

My Ideal 1912 Automobile

Readers' Conceptions of What Next Year's Car Should Be

Readers continue to demonstrate their interest in the ideal car and the specifications which are submitted show a wide range of taste and requirements. In view of the interest shown the Editor continues to extend the invitation to all who entertain ideas on this absorbing topic, to submit their opinions for publication. The description should be legibly written on one side of the paper and signed by the sender, although if it is so desired the name will not be published.

Ideal a Lively Roadster

EDITOR THE AUTOMOBILE:

My ideal car for next year is a roadster that would have to step some. The motor would be four-cylinder, four-cycle, with the cylinders cast in pairs, and it would have a bore of 5 3-4 inches and a stroke of 8 inches. The cylinders would be of the T-head type with the valves on opposite sides, and they would be 3 1-4 inches in diameter at the bottom. The motor would have three large bearings, and the clutch would be of the large diameter cone type. The transmission would have four speeds ahead and reverse, with direct drive on third speed, and would be geared 1 1-2 to 1.

I would prefer a shaft to a chain drive, even in a car of this size. The rear axle would be a full floating type, and the brake drums would be about 14 inches in diameter with 4-inch faces. The car would have an underslung frame, with 36-inch wheels carrying 5 1-2-inch tires.

The engine would be equipped with a Remy magneto and a Schebler carbureter, and it would have an auxiliary air pump. The gasoline tank would be placed on the back along with the oil tank.

This car, with 124-inch wheelbase, equipped with glass front, speedometer and hand oil pump, ought to sell for $3000.

L. E. HOWE.

Liberty, Ind.

Wants Long Stroke Motor

Editor THE AUTOMOBILE:

The specifications of my ideal of a motor car should be as follows: Cylinder bore, 4 1-2 inches; stroke, 6 inches; six cylinders; four ball bearing crankshaft; cam shaft on left with four ball bearings; intake valve in the head; exhaust valve on left side; intake manifold at right side, water-jacketed; Rayfield carbureter with dash adjustment; force-feed oiling by gear pump with reservoir in the bottom of the crankcase; Bosch dual ignition system; honeycomb radiator with centrifugal pump; gasoline feed by gravity; self-starter using compressed air, with tank (which should also be used for filling tires) underneath the car; multiple-disc clutch, having 26 saw steel driving plates and 25 bronze driven plates, running in a bath of oil, four-speed transmission on roller bearings, with reverse; flywheel, clutch, transmission and motor in unit; rear axle of the full floating type on roller bearings; one universal joint back of the transmission, and another in front of the rear axle; front axle to be of I-beam construction, drop forged in one piece, and on roller bearings; cross rod behind the axle; steering gear of worm and wheel type, with spark and throttle levers at top of an 18-inch wheel; control levers at the right side; foot pedal at the right; clutch pedal at the left; button type accelerator; metal body, with wood frame; 10-inch upholstery; body of five-passenger torpedo type with cowl dash; control levers inside; 126-inch wheelbase; front wheels to have twelve spokes and rear to have fourteen, both 36 inches in diameter and to be made of second growth hickory; every other spoke of the rear wheels bolted to the brake drums; service brake to be internal expanding; 14 inches by 3 inches; emergency brake to be external contracting, 15 inches by 3 inches; both brakes to be lined with Thermoid; front springs to be semi-elliptic; rear springs to be three-quarter elliptic with grease cups at all bearings.

The accessories should include the following: Mohair top, windshield, Stewart speedometer, Gray and Davis electric lighting dynamo system, seat covers, trunk rack, quick-detachable demountable rims, battery and tool box on the left side, large enough to accommodate one inner tube, Klaxon horn, 36 x 4 tires, Truffault-Hartford shock absorbers.

The car as outlined should cost about $3000.

CARL H. ANDREAS.

St. Louis, Mo.

Has Criticisms to Offer.

Editor THE AUTOMOBILE:

I have read with intense interest the opinions of your readers regarding the specifications of the ideal car for the season of 1912. In my opinion the ideal car for any man is not governed so much by what he really thinks would be the best car which it is possible to construct, but would, on the contrary, be the best car which it is possible to build for the amount of money that the particular person may happen to have at his disposal for the purpose of purchasing an automobile.

There are many minor refinements which, while they are not a necessity, still add to the ease of running of the car or to its appearance to some slight extent, while the cost of their application to the car is far beyond the benefit to be reaped from their installation. The matter of wheel sizes is one of these cases where a large increase in cost arises from a slight increase in size; still every one is ready to admit the advantages of wheels of large diameter. Tire equipment in the first place will cost considerably more than would be the case with smaller wheels, and even though it be true that the wear on the tires will be correspondingly less, still at the same time this is not generally perceived by the purchaser of the car, who is not prone to consider the subsequent cost of upkeep when he first examines what he is getting for the amount of money he is laying out in purchasing his automobile.

There are numerous other details which enter into the problem of selecting an ideal car which, in my opinion, have been overlooked by those whose descriptions have been published in the pages of THE AUTOMOBILE, and among them there is the matter of body construction and appointments. It is all very well for the carping critic to say that the average automobile buyer will more often ask a question concerning the quality of the paint on the body than he will attempt to delve into the mysteries of the lubricating or ignition systems, but it must be admitted that there is a large amount of solid sense involved in the queries which are hurled at the head of the obliging automobile salesman. Fine feathers make fine birds in the automobile world as well as in the marts of the Parisian fashions, and the man who hands his last dollar over to the automobile concern whose wares have best satisfied his critical eye is justified to a large extent in clamoring for a beautiful appearance as well as a smooth-running motor.

Body finishing has advanced along with other departments of the game, and in my specifications of the ideal car I would include a few requirements regarding this part of the car and I think that my ideas do not clash with those of the majority of automobilists who go to make up that class known to the automobile trade as the average motorist. J. P. HEWITT.

New York City.

Accessory Handling in Repair Shops

WHEN an automobile comes to the repair shop to be overhauled, thoroughly and well, from front to rear axle, the score of small accessories present on the car will have to be removed therefrom. This must be done to avoid such damage as will inevitably result from omitting this work. There is not a repairman or automobilist who would for a moment question the necessity of removing the accessories from the car. Clock, speedometer, odometer, lamps of all descriptions, and last but not least, tools, are too valuable to run the risk of breaking or losing them. If this should happen, it would of course mean double loss to the shop owner or manager; he would have to make reparation for the goods lost and a customer would be gone never to return.

In order to attain the end in the simplest way imaginable, the system used to insure owner and shop operator against the complication arising from disorder in this field will have to be as simple as it is efficacious. While the task of checking all small articles going off and on the car requires the attention of a conscientious and reliable worker, there is no need that he should be unusually bright or skilled. A boy will be able to attend to this end of the business, and there is nothing to bar him from a successful execution of his work. It is the practice in the large repair departments of New York City to have one boy do all the work of this kind, and superintendents are well satisfied with the success of the system.

When the car comes into the repair shop it is accompanied by a card bearing the name of the owner, the number of the car and a repair order number. The first two items are transferred to the head of the accessories card Fig. 1. Upon this card are entered all the accessories which have to be taken off the car, and the same is done with those parts which, for some reason or other, have to be removed, as was the case with the hub caps on Mr. Bigelow's car. The entries are made under the heading "In," and where it is not necessary to write numbers, a simple check will be made by the workman or boy. In most cases the articles printed on the sheet will cover the accessories which are thus handled, but when it comes to a speedometer, which does not originally appear on the form, the boy enters it on the sheet himself. There may be little objection to entering a speedometer under "Special Instrument," but a careful operator will always try to avoid any unclear statement on this card.

To each accessory, as it is taken off the car and entered on the card, a tag is attached, upon which the car owner's name, the car number and the number of the repair order are entered. Then all the accessories coming from one car are placed in a locker and its number is noted on the card, Fig. 1.

All the time the overhauling work is going on, the accessories remain in their own locker, undisturbed by the happenings in the repair shop. Only when the automobile is otherwise ready to leave the shop for its final test on the road the sundries are taken out of the locker and checked while this is being done. If, for some natural or supernatural reason, one or more of them has disappeared, the fact is noted on the card, as was the case with one of Mr. Bigelow's three oil-cans. (The card here shown has not been filled out in connection with an actual job, but only to illustrate its uses.) The operator who checks the accessories as they are taken out of the locker and replaced upon the automobile, signs his name on the card, which is

IN Owner L. J. Bigelow OUT
Type
Model 39
Car No. 1703
When Received Oct. 4- 1911
When Delivered Oct. 13-1911

ACCESSORIES ON CAR WHEN RECEIVED

	In	Out
Tires Front 2	✓	✓
Tires Rear 2	✓	✓
Extra Shoes Front		
Extra Shoes Rear	1	✓
Extra Tubes Front		
Extra Tubes Rear	1	✓
Hub Caps, 4	4	✓
Fenders	✓	✓
Foot Rest		
Mat		
Cushions Front		
Cushions Rear		
Horn, Tube & Bulb	✓	✓
Dash Lamps	2	✓
Head "	2	✓
Tail "	1	✓
Coil	✓	✓
Tires Irons		
Robe Rail		
Crank Hanger & Strap	✓	✓
Generator		
Special Horns Tuto	1	✓
Gas Tank	1	✓
Air Tank		
Special Instrument		
Clock	1	✓
Seat Covers		

	In	Out
Top Curtains	✓	✓
Storm Front Curtain		
Envelope		
Shock Absorber	4	✓
License Tags	2	✓
Trunk Rack		
Wind Shield	1	✓
Storm Apron		
Oil Cans	3	2 X
Bonnet Strap		
Tire Chains	2	✓
Bumpers		
Extra Seats		
Flower Vase		
Toilet Cases	✓	✓
Toilet Articles	✓	✓
Robes	~~2~~	
Coats	2	✓
Watch		
Gloves	2 pr.	✓
Batteries one No. Cells	4	✓
Tool Box Locked /	✓	✓
TOOLS Kit of Tools Complete	yes	
Speedometer	1	✓

Shortage if Any
Tool can

Locker #12.

Checked in by J. R. White Checked out by T. F. Clark

Fig. 1—All the small articles on an automobile are taken off and locked up while the car is being overhauled, and an exact record is kept of them

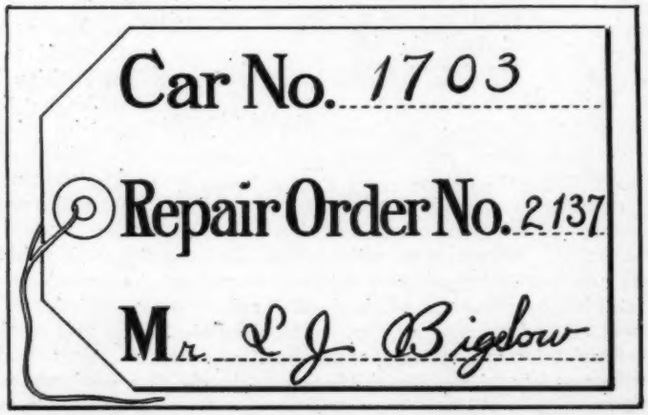
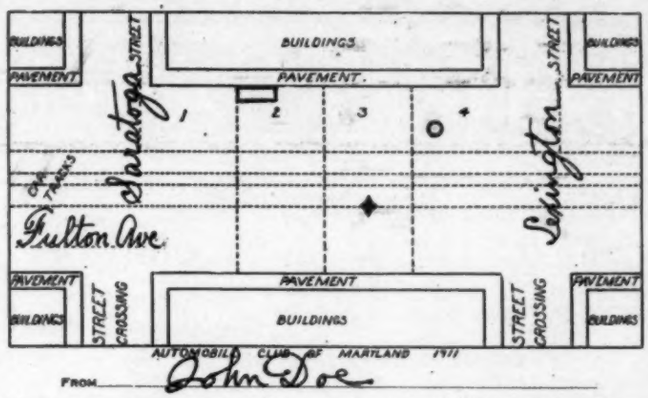


Fig. 2—To each article, be it a tire or a pair of goggles, is attached a tag giving all the necessary information relating to it

then transferred to the files of the repair department, where it is kept for any future reference that might become necessary. Whatever accessories are missing and cannot be found, are, of course, replaced.

The card illustrated is used in the repair department of the Peerless Motor Car Company, 1758 Broadway, New York City. Other concerns use somewhat different cards for the purpose of keeping track of accessories, but the variations are not fundamental. For instance, at the repair shops of the United Motor Company, Broadway and Sixty-first street, New York City, a very effective system has been introduced to help the concern to cope with the problems of the repair situation, but no special blanks are used for checking over accessories. The superintendent of the service department of this company is of the opinion that, with a reliable boy attending to the matter of checking accessories in and out, no special form is required. At the same time it is important that this work, consisting of a vast number of minor performances, should not be treated as a side issue by the worker, or chaos and consequent loss of efficiency and money will be the result. If the right sort of boy is used for the work, he will not be difficult to break in on it, and after a short time will be able to perform all his jobs with a minimum of control by the superintendent. After having introduced a system in handling the work in this department no repairman who means business has been known to discard the system. It is inexpensive to use, but too expensive to do without.



Fac-simile of postal card issued to members by Automobile Club of Maryland.

Circle O indicates round, dangerous hole. Star ★ indicates sunken place in street, not necessarily dangerous. Oblong rectangle ▭ indicates trench or depression at right angles to the street. Paragraph ¶ indicates other conditions.

How the Maryland Club Watches Streets

BALTIMORE, MD., Nov. 20—At a recent meeting of the board of governors of the Automobile Club of Maryland the president appointed ten members to serve as a special committee on street repairs. This committee developed a plan for systematic notification of bad conditions in the streets of Baltimore which was heartily indorsed by the city engineer, Mr. H. K. McCay. A number of postal cards like that shown in the illustration, the reverse of which contain directions for indicating the location of holes, etc., in the paving, were sent to the club members to be filled out and mailed to the secretary. He turns them over to the city engineer as they come in, unless the trouble is within 2 feet of the car tracks, when he notifies the railway company. Sometimes, as in the example shown, the secretary finds conditions indicated for which both the city and the railway company are responsible. In this case he turns the card over to the city engineer and sends a notice to the railroad officials.

Another L. I. A. C. Contest

The contest for the Schimpf trophy proved so successful and the attendance was so encouraging that the contest committee of the Long Island Automobile Club has decided to hold a similar event on Saturday, November 25. It will be held under somewhat stricter rules than governed the competition for the Schimpf trophy and will be run over the 100-mile course.

The prize, which will be an automobile tire of any make and size desired by the winner, has been generously donated by Secretary Charles Hermann. The contest committee of the club consists of Edward Ashforth, William H. Kouwenhoven, Edward Melvin, William T. Wintringham and Frank G. Webb, chairman.

Calendar of Coming Events

Shows

Dec. 30-Jan. 6.....Buffalo, N. Y., Annual Show, Seventy-fourth Regiment Armory, Buffalo Automobile Trade Association.
Jan. 2-11.....New York City, Hotel Astor, Importers' Salon.
Jan. 6-13.....New York City, Madison Square Garden, Twelfth Annual Show, Pleasure Car Division, Automobile Board of Trade.
Jan. 6-20.....New York City, Madison Square Garden, Annual Show, Motor and Accessory Manufacturers.
Jan. 10-17.....New York City, Grand Central Palace, Twelfth Annual Show, National Association of Automobile Manufacturers; also Motor and Accessory Manufacturers.
Jan. 13-27.....Philadelphia, Annual Show, First and Third Regiment Armories, Philadelphia Automobile Trade Association.
Jan. 15-20.....New York City, Madison Square Garden, Twelfth Annual Show, Commercial Division, Automobile Board of Trade.
Jan. 13-19.....Milwaukee, Wis., Auditorium, Fourth Annual Show, Milwaukee Automobile Dealers' Association
Jan. 22-27.....Detroit, Mich., Wayne Gardens, Eleventh Annual Show, Detroit Automobile Dealers' Association.
Jan. 22-27.....Providence, R. I., Providence State Armory, Rhode Island Licensed Automobile Dealers' Association, Automobile and Accessories Show.
Jan. 27-Feb. 10....Chicago Coliseum, Eleventh Annual Automobile Show under the auspices of the National Association of Automobile Manufacturers. Pleasure cars, first week. Commercial vehicles, second week.
Jan. 27-Feb. 10....Pittsburgh, Pa., Sixth Annual Show, Automobile Dealers' Association of Pittsburgh, Inc. Pleasure cars, first week. Commercial vehicles, second week.
Jan. 29-Feb. 3.....Scranton, Pa., 13th Regiment Armory, Second Annual Show.
Feb. 3-10.....Montreal, Canada, National Show, Drill Hall, Automobile Club of Canada.
Feb. 5-17.....St. Louis, Mo., Coliseum, Annual Show, Pleasure cars, first week. Commercial vehicles, second week.
Feb. 12-17.....Kansas City, Mo., Annual Show, Combined Association of Motor Car Dealers.
Feb. 17-24.....Pittsburgh, Pa., Second Annual Show, Exposition Bldg., Pittsburgh Auto Show Association, Inc.
Feb. 14-17.....Grand Rapids, Mich., Third Annual Show.
Feb. 17-24.....Newark, N. J., Fifth Annual Automobile Show, New Jersey Automobile Exhibition Company, First Regiment Armory.
Feb. 17-24.....Minneapolis, Minn., National Guard Armory and Coliseum, Annual Automobile Show, Minneapolis Automobile Show Association.
Feb. 19-24.....Omaha, Neb., Seventh Annual Show, Auditorium, Omaha Automobile Show Association.
Feb. 19-24.....Hartford, Conn., Annual Show, Automobile Club of Hartford, State Armory.
Feb. 20-24.....Binghamton, N. Y., State Armory, Third Annual Show, Automobile Dealers' Association.
Feb. 20-28.....Baltimore, Md., Annual Show, Baltimore Automobile Dealers' Association.
Feb. 21-28.....Toronto, Ont., Annual Show, Toronto Automobile Trade Association.
Week Feb. 22.....Cincinnati, O., Annual Show, Cincinnati Automobile Dealers' Association.
Feb. 24-March 2...Brooklyn, N. Y., Twenty-third Regiment Armory, Annual Show, Brooklyn Motor Vehicle Dealers' Association.
Feb. 26-Mar. 2.....Elmira, N. Y., Second Annual Show, Elmira Automobile Club.
March 2-9.....Boston, Mass., Tenth Annual Show, Boston Automobile Dealers' Association, Inc.
March 4-9.....Denver, Col., Auditorium, Annual Show.
April 6-13.....Ottawa, Ont., Howick Hall, Annual Show, Ottawa Valley Motor Car Association.

Meetings, Etc.

Dec. 20.....New York City, Waldorf-Astoria, Annual Banquet of the Automobile Club of America.
Jan. 18-20.....New York City, Annual Meeting of the Society of Automobile Engineers.

Race Meets, Hill-Climbs, Etc.

Nov. 27.....Savannah, Ga., Vanderbilt Cup Race, Savannah Automobile Club.
Nov. 30.....Los Angeles, Cal., Track Races, Motordrome.
Nov. 30.....Savannah, Ga., Grand Prize Race, Savannah Automobile Club.
Dec. 25-26.....Los Angeles, Cal., Track Races, Motordrome.

THE AUTOMOBILE

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THE CLASS JOURNAL COMPANY

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CONDE NAST, Vice-President and General Manager

E. M. COREY, Secretary and Treasurer

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Metallurgy Made Easy

IN this issue THE AUTOMOBILE begins a series of articles on the subject Automobile Metallurgy Made Easy, which series will appear weekly covering a period of several months. The object of the series is explained in the title, namely, not only making easy the question of metallurgy but also imparting elementary knowledge of the different metals entering into the make-up of the modern automobile. A great deal of ignorance exists among the laity on the subject of metals. Many salesmen glibly use the terms nickel steel, vanadium steel, chrome nickel, tungsten, bessemer, open-hearth, etc., but how many know their meaning? How many know why they are used? How many can explain why the tensile strength factor is so important in the metal entering into one part of a car and yet not important in some other parts? In the textile world a man knows that cotton clothing does not constitute a good protection against cold. He knows that cotton is suitable for Summer wear, but that wool is best for cold weather. In the food field it is a well-understood fact that fats and oils are excellent for cold weather, but bad for use in Summer or for those who take little outdoor exercise. So it is in many of the other departments of life in which people are interested, but when it comes to the problem of the metals entering into an automobile and their why and wherefore, a new question suddenly arises. It is with the hope of imparting some practical information of this character that this series has been started. The series is for the car owner, the car dealer, the salesman and the laity in general. The series is not intended for the engineer, or the metallurgist. It is too elementary for them. The series is intended to serve as an alphabet of metals, a short series of brief stories on the qualities that metals must possess in order to be useful in the different parts of the automobile.

The series opens with five articles on the qualities specified for all steels, namely, tensile strength, elastic limit, elongation, torsion and the many vibrational strains. Following this the different kinds of steels will be treated, low-carbon steels, high-carbon steels, nickel steels and other grades such as chrome nickel, vanadium, titanium, bessemer, open hearth, crucible, electric, forged steel, rolled steel, pressed steel and steel castings, the last four referring to operations of manufacturing steels into parts intended for automobile uses. The series will continue along this line, including cast iron, cast brass, cast bronze, cast aluminum, steel castings and malleable iron castings. The bearing metals, such as phosphor bronze, white brass or bronze, babbitt and die-cast bushings, will receive attention. The entire scope of the series is such as to give the car owner who does not understand metallurgy a good general conception of the many metals; to give him a conception at least of why a certain metal is necessary in a certain part of a car so that he will be able to intelligently discuss metals and their uses when purchasing a machine.

To those whom these articles do not satisfy additional information will be furnished. All that is necessary is to write your wishes and mail them to the Editor. Sign your name and address legibly. They will both be used in conjunction with your communication. This series is for the layman and he is invited to open discussions, ask questions, etc. The series should be of special value to the dealer, the repairman and the salesman. Many of these have never been inside a factory, a foundry or a heat-treating room, so that the articles appearing will serve as an elementary course of information along a line which is daily growing in importance.

* * *

The Accessible Car

ATTENTION was drawn to accessibility in these pages some weeks ago, the chief reason advanced for it being that it reduces the cost of car operation and so administers to the general good of the cause. Since then the foreign makers have exhibited their 1912 wares to the public at the great Olympia show, and it is interesting to see how much advancement they are making along this matter of accessibility. One foreign engineer, in speaking on the subject of accessibility, mentioned the two broad phases of accessibility that should be kept in mind, namely: First, accessibility in the matter of those parts of the car that require more or less attention from the driver when on the road or in the garage at the end of a day's run; and second, that constructive accessibility which exhibits itself when a car is delivered to the repairman to have such parts as differential, clutch or gearbox overhauled or repaired.

The first class of accessibility has to do chiefly with the owner and driver. It incorporates such features as brake adjustments, which can be used without twisting the arm L-fashion around springs, shock absorbers, fenders and axle parts; it applies to the location of grease-cups, which can be reached without covering the coat sleeve with grease; it applies to the carrying of tools, which are so placed as to be obtained without getting anybody out of the car; it applies to that axle design which allows placing a jack under the front or rear axle and elevating either without having to spend a long time; it applies to the carbureter location in which the shutter-valve, for starting, the air valve or needle valve adjustments are reached without having to put on an elbow-glove: it applies to those lubricating features in which it

is possible to drain the old oil out of the crankcase without getting under the car to open a petcock in the base of the crankcase; it applies to those oil-filling designs which permit of pouring in oil from an ordinary gallon can without spilling a goodly portion over the motor parts; it applies to those magneto fastenings which allow of removing the magneto in less than 5 minutes and of replacing it in an equally short time—there are some makes in which it takes over an hour to remove the magneto. In a word, it applies to all such parts of a car as require attention either for the purpose of lubrication or adjustment.

The second accessibility is that which saves money when the car is placed in the repair shop. If the differential unit has to be removed, it should be removable through the opening in the differential housing. In some cars the entire axle has to be detached from the car, the axle sleeves removed from the housing and other disassembly carried out. This is very expensive; it means hours of work by the repairman. If the clutch has to be removed it should be removable without having to take off the gear box or loosen the motor from its supports. Time saved means money saved in this field. So it is if the lower bearings of the connecting-rods have to be taken up; if the carbon has to be taken out of the cylinder-heads; if the piston-rings have to be replaced; if a cylinder casting has to be removed; or if a radiator has to be taken off. A buyer should look to this matter of accessibility in buying a car. With the approach of the show circuit he should study the big problem of accessibility; it will mean money saved to him after buying the car, providing the automobile which he purchases is of as good material and workmanship as the less accessible one.

Coffin Addresses British Engineers

LONDON, Nov. 15—Howard E. Coffin, past president of the Society of Automobile Engineers delivered one of the feature addresses presented to the joint session of the Institution of Automobile Engineers and the S. A. E. held here. The joint convention was attended by about sixty members of the American society and was marked by most cordial relations between the British hosts and their visitors.

Mr. Coffin's remarks were in part as follows:

A comparison of the engineering practice entering into the better class of American cars does not show any greater degree of uniformity than is to be found in the similar class of English cars. Various spring suspensions are to be found; single and double-jointed cardan shafts are in evidence; some rear constructions are fitted with a torque-absorbing member and some are not; the drive of the road wheels is transmitted to the main frame through the springs, through radius rods or through a tubular housing for the propeller or cardan shaft, etc., as may suit the whim, the pet theory or the necessities of the individual designer.

High-powered motors are a necessity, first, because of the excess of brute power required to negotiate the poorer class of roads at speed; and, second, because of the antipathy of the average American towards the use of the gear-shift lever.

As nearly as can be judged at the moment, the coming of the long stroke will mean no lessening of bores—merely an increase in powers. A six-cylinder car, for instance, formerly 5x5½ inches in bore and stroke, will for this year be 5x7. Four-inch engines are moving up from 4x4½ to 4x5, 4x5½ and even 4x6, with no very great changes otherwise in the chassis or weight of the finished car. The low price of fuel and the low rate of or total absence of horsepower taxation tend to encourage rather than discourage this advance in power. A broad statement may almost be made, that no American car above the smallest two-seater will carry a four-cylinder motor of less than 4-inch bore. One or two instances, such as the Hupmobile, may be said to be the exceptions which prove the rule.

Another peculiarity often remarked by those from this side of the water is the brake location. Double brakes upon the rear wheels have become an almost universal practice. Almost every argument in the category can be cited in favor of the cardan shaft service brake. European precedent is a unit for it.

The character of American roads and the conditions under which American cars are forced to perform have had necessarily a great influence upon the direction of detail development. Road clearances, spring lengths and spring clearances, the avoidance of extreme lengths in wheelbase, precautionary measures against squeaks and rattles through leather and rubber liners, bronze bushings, numerous grease cups, etc., the deep ribbing or beading of all sheet-metal surfaces for the prevention of vibration, the secure locking of every bolt and nut in its place, these and a hundred and one other of the things are being given a particular attention because of the nature of the service to be encountered at the hands of the American user.

American cars, and hence American standards of motor engineering, were for years regarded as somewhat of a joke upon this side of the water. But because American design differs from those principles which have been found to succeed in Europe, it must not be assumed that the American designer is ignorant as to the trend of practice upon this side of the water. The light, high-speed, small-bore motor of 12 to 15 horsepower would perform admirably upon the English-like roads of New England, but would fail miserably in the face of the hub-deep, sticky gumbo of some sections of the Middle West.

Ample road clearance is an absolute necessity upon any car which is built in quantity to meet a nation-wide market in the states. Hence larger wheels, greater axle and flywheel ground clearance, and a generally somewhat higher car appearance than is usual upon this side.

Few cars of any power or price will go into the next season without self-starting motors. Several are already fitting starters as regular equipment for this season, and many others are following suit.

Next the lighting problem. Six months ago it looked like a walkaway for the electric generating outfit. But the fears of electric competition have brought gas lamp improvements, whereby one may, with a single switch turning movement from the seat, turn on and light the acetylene gas lamps. The use of the acetylene self-starter also would seem to argue well for the retention of the gas light in combination.

As to en bloc castings and the protection of working parts, I do not believe that the newer American cars will be found to differ greatly from European practice.

I already have mentioned one or two chassis peculiarities. To these I might add the frequent positioning of the gear box upon the rear axle member. I presume that the arguments pro and con upon this subject are much the same with you as with us—weight and tire wear upon one side and gear quietness with manufacturing and repair advantages upon the other.

No engineering discussion would just now be complete without some mention of special motor valves. The Knight motor you know. It is now being adopted by four makers in the states, and apparently with success. There are several American valve mechanisms which seem to promise well. Every one is of the rotary disk or rotary valve type. It seems to be the American creed that if the poppet valve is dropped, it would be a mistake to replace it with another reciprocating mechanism—sleeve or otherwise.

It is not to be expected that the coming annual show in January in New York will bring out any marked change in clutch construction. The cone probably will show a percentage of increase, not because the disk and other types are being abandoned, but because a larger number of the newer and cheaper models will carry the cone as the cheapest form of the reasonably satisfactory clutch. There is one form of clutch coming into use in the states which is, I believe, entirely unknown upon this side of the water. I refer to the multiple-disk form using cork for the friction surface. I will make the broad statement that the properly constructed cork-surfaced clutch will distance all others in smoothness of action, length of service and freedom from trouble both in the factory and upon the road.

Power tire pumps are being fitted to many of the higher and medium-priced cars—the demountable rim may be said to be becoming almost the regular equipment of all but the very cheapest machines.

There is a marked tendency toward the use of roller bearings of which several makes are well known in the states.

Demountable wheels—wood—have been for several years fitted as regular equipment by one of our American makers. It does not seem probable that this practice will spread. Wire wheels have lost favor and in 1903 and 1904, when the good public made up its mind in favor of wooden spokes, American manufacturers were forced to scrap thousands of sets of wire equipment because the turn of the tide came so suddenly.

There can be no better school of design than the racing camp during the 2 weeks' practice period just before some big 200 or 300-mile road race. But here, as in every other line, a definite system must be followed if the best returns in an engineering as well as a publicity way are to be had.

A not unusual method of procedure is to place the chief engineer either directly in charge of the contest work or at least in close working contact with contest crew management. A crew is more than frequently made up of a business manager and from two to three cars with drivers and mechanics. If the engineer is wise he will have placed upon his desk an almost daily detailed report of the performance and troubles of these contest cars. I don't know of a more searching trial of steering connections, wheels, motors and, in short, of the entire driving mechanism than is the 300-mile road race or the 2,000-mile endurance run covering every possible road condition.

The encouragement of the stock car contest has been of unusual value to the engineer and hence to the progress of the industry in the states. Not only has the American engineer been constantly able to judge of the performance of standard cars under severe service conditions, but he has been no less the gainer in that he has had his whole attention riveted upon a bread and butter model, rather than upon some monster racing car.

Just now we are hearing much over here of the American invasion of the English market. There seems to be a good deal of worry, at least upon the part of the press. I don't quite see why England fears an invasion. The invasion is of the cheap car, I believe it is called. If the cheap car has a field in England, the probabilities are that it is a field to which you have not yourselves catered. It seems to me that you may meet the issue either by building low-priced cars yourselves for this demand or by keeping out of this field and sticking to the class of product to which your preferences and your methods incline you. We have been through the same thing in America exactly. The production of the $500 car by Ford was croaked to be the death knell of all high price getting. There have been several death knells since Ford, and Ford himself is still at it to the tune of 75,000 cars for 1912.

General Motors Reports Good Year

NET profits amounting to $4,066,251.31 were made by the General Motors Company during the 10 months preceding July 31, 1911, according to the first annual statement of that organization since the flotation of its $15,000,000 bond issue a year ago. The period covered by the report is not a full year because the fiscal year of the company now ends July 31 in place of October 1, as heretofore. After deducting $750,000 interest on the bond issue; $506,226 for the April dividend and making a proportional reservation for the October dividend, there remained $2,474,176.98 as undivided profits.

The bonded indebtedness has been reduced to $13,454,000 by the retirement of $1,546,000 of the bonds.

During the year it was decided to write off and reduce some of the inventories taken October 1, 1910, and this has been done to the extent of $2,000,000, thus leaving the surplus of the company at $1,240,175.26.

Under the financial plans of the company $1,500,000 will be retired in 1912 and $2,000,000 in 1913 and 1914 respectively. The remainder of the bonds will mature the following year.

The total net working capital of the corporation, according to the report is $23,065,353.20, or practically $10,000,000 over its bonds. During the period covered capital expenditures for permanent improvements, largely the purchase of land, building and equipment to extend the Cadillac plant, amounted to $1,803,030.68.

President Neal says that all the factories included in the properties of General Motors were working practically at full capacity at the time the report was submitted to the directors, there having been a gradual resumption of activity.

Among the plans projected for the company is the perfection of a general staff of mechanical engineers, gasoline engine engineers, designers, production experts and other experts to advise with and assist the staffs of the various factories. The new laboratory under charge of the director of production has been elaborately equipped for testing materials and preventing factory errors. The General Motors Export Company, to sell the corporation's products abroad proposes to make Bedford Motors Limited of London its distributing branch for continental Europe. The General Motors Truck Company has been organized to market the truck products of the company.

President Neal declares he is hopeful for the coming year and states that business is on a satisfactory basis.

The assets of General Motors amount to $54,388,072.58 according to the report of Comptroller Magee.

The liabilities include stock issues of $30,215,830; bonds $14,002,000; current liabilities, $2,785,615.01 and cash surplus, $4,443,251.31. In the above, the item of bonds was reduced to $13,454,000 as of October 1, 1911.

During the past year the company has taken up $46,000 of its bonded debt in excess of requirements. The action of the directors in writing off $2,000,000 from the inventories submitted at the time the bonds were sold tends to improve the position of the company by making allowance for depreciation and possible overvaluation of assets. Of the twenty-one companies embraced in General Motors, the corporation owns a total of $14,611,003 of their stock issues out of a total of $16,114,003.

The report was favorably received by the trade, over which the financial situation of the company hung like a cloud prior to the successful flotation of the big bond issue in the Fall of 1910.

The retirement of $1,546,000 of the bonds during the first year of operation under the new financial plan will decrease interest payments by $92,760. If the regular course is followed in 1912, the interest charge will be further reduced by $90,000 and during 1913 and 1914 respectively, $120,000 will be cut off. Thus the charge for interest would be reduced from $750,000 a year as it was after the bonds were sold to $327,240.

The company has the right to retire any or all of the bonds before they are due at 102 1-2 and accrued interest.

The officers of the corporation at the date of the report were as follows: Thomas Neal, president; W. C. Durant, W. J. Mead, Emory W. Clark, vice-presidents; Standish Backus, secretary; James T. Shaw, treasurer and C. A. Magee, comptroller. The finance committee includes: Emory W. Clark, W. C. Durant, Andrew H. Green, Jr., and Edwin D. Metcalf.

Trucks in Mail Delivery Service

WASHINGTON, D. C., Nov. 20—Three Franklin motor buses with specially built bodies were placed in the delivery service of the city post office this week. The service is being handled by David S. Hendrick, agent for Franklin cars, who was awarded the contract for furnishing the service for a four-year period at the lump price of $74,000. The buses will make eight trips a day, four during the day shift from 7 a. m. to 4 p. m. and four from that hour to midnight. Each trip will be for collection service, but on the first three trips each day the carriers will be taken to points where their routes begin.

The idea of using motor service in this particular manner originated with Postmaster-General Frank Hitchcock, and if the service is a success here it is likely it will be extended elsewhere.

One-thousand-pound Franklin chassis are used to which have been fitted bodies built by McReynolds & Son. Seats are built in the interior of the buses, entrance being through the rear. There is also a rack for mail bags. The driver and one carrier are carried on the front seat, while there is ample room for eight carriers inside each bus.

Akron Tire Industry Increasing

AKRON, OHIO, Nov. 20—"Things are picking up and business is becoming more and more stable during the Winter season," says C. B. Raymond, secretary of the B. F. Goodrich Company. "We expect that the coming national election will have some effect on the rubber business as on all other lines of business, and consequently no immense supplies of raw material are being stored locally, and the finished product will be kept down pretty well to actual orders. But the demand itself is increasing and I look forward to a very good year in 1912 in spite of the election."

Akron rubber factories, all of which are centered largely upon the manufacture of tires, employ 17,000 workers. Plans now indicate that this number will be increased at least 2,000 during the Winter.

Development along various market lines is credited with the steady increase of the tire demand. For one thing, local manufacturers say, automobiles are being used more generally in the rural districts. Another reason is the more general use of automobiles in Winter as well as Summer. The third reason for Akron tire activities is the development of the motor truck.

Over Fifty Cars in Georgia State Tour

ATLANTA, GA., Nov. 20—A striking example of the trend of popular favor toward non-technical, nearly non-competitive automobile runs will be given by the tour around Georgia, which will start from Atlanta November 22 with certainly well over 50 automobiles in line.

That such a number of entries can be secured in a State where automobiles are not as numerous as they are in the Eastern States at a time when vacations are all over for a jaunt which will include six days of touring and five days at Savannah shows something of the popularity of near-sociability runs.

In this event there will be no technical requirements, 18 miles an hour will be the fastest speed required, contestants may run during the noon hour without having it counted in their running time and any repairs can be made at any time. If repairs are made while the cars are in controls it will not be charged against the cars. Under conditions of this sort the Tour Around Georgia has been able to secure a highly creditable list of entries.

The night stops of the tour will be Americus, Valdosta, Baxley, Savannah, Dublin and Atlanta. The officials chosen already are Joe Brown Connaly, referee; R. C. Clarke, starter, and P. H. Hammond, checker. Prizes amounting to $2,600 have been offered to be divided among the winners in the various classes.

The tourists will spend from the night of November 25 until the morning of December 1 in Savannah, where they will witness the running of the Vanderbilt, Grand Prize and lesser events.

More road preparations are being made for this tour perhaps than were ever made before for a State event. Signboards have been placed at all cross roads and will serve to mark a permanent ideal tour aroung Georgia. In Bullock and Emanuel counties three bridges have just been completed over streams that have given trouble in previous tours. In these counties and in Laurens new strips of road are just being finished especially for this tour and hundreds of convicts are toiling long hours on the final touches.

The Adrian-Scott cut-off in Johnson county is also being completed and will be in fine condition. Unless there is rain the tourists will have excellent going all the way from Atlanta back to Atlanta. Of course, under the conditions of the tour not all the competing cars will start from the Georgia capital but can pick up the tour at any control. All that is required is that they complete the entire circuit. However, most of the contestants will come to the Gate City for the big getaway.

The entries up to November 18 were:

1—Atlanta Ad-Men's Club, Atlanta, Overland.
2—Ohio Motor Car Company, Cincinnati, Ohio, Ohio.
3—Dr. J. C. Luke, Ocilla, Ga., Ohio Motor Company's sales agent, Ohio.
4—Ohio Motor Car Company, Ocilla, Ga., sales agency, Ohio.
5—Jake W. Paulk, Ocilla, Ga., Ohio.
6—W. E. Sawyer, Americus, Overland.
7—S. C. Dunlap, Gainesville, E-M-F.
8—A. M. Kitchen, Cornelia, Ga., E-M-F.
9—Balkcom & Ricketson, Boston, Ga., E-M-F.
10—W. V. Kriegshaber, Atlanta, Chalmers.
11—Atlanta Chamber of Commerce, Cole.
12—H. B. Odell, Atlanta, Thomas, pacemaker.
13—W. D. Alexander, Atlanta, Dorris.
14—Miss Regina Rambo, Marietta, Ga., Overland.
15—T. C. Lauren, Atlanta, Packard.
16—Dr. B. L. Bridges, Ellaville, Ga., Buick.
17—George H. Fauss, Atlanta, Dorris.
18—M. Luke, Jr., Ocilla, Ga., Everitt.
19—Velie Motor Vehicle Company, Atlanta, Velie.
20—Velie Motor Vehicle Company, Atlanta, Velie, press car.
21—Frank G. Corker, Dublin, Ga., White Gas.
22—Sam Bashinski, Dublin, Ga., Chalmers.
23—Dolph Walker, Atlanta, National.
24—Marathon Motor Car Company, Nashville, Marathon, press car.
25—D. Woodward, Atlanta, Knox.
26—J. Leon Bell, Swainsboro, Ga., Cadillac.
27—N. E. McLeod, Swainsboro, Ga., Westcott.
28—U. S. Fuller, Culloden, Ga., Cadillac.
29—D. D. Armstrong, V. P. of T. C. A., Atlanta, Thomas.
30—Holmes Bros., Culloden, Ga., Buick.
31—W. A. Thacher, Decatur, Ga., Buick.
32—W. A. Thacher, Decatur, Ga., Buick.
33—E-M-F Company, Atlanta, G. W. Hanson, manager, Flanders.
34—E-M-F Company, Atlanta, G. W. Hanson, manager, Flanders.
35—E-M-F Company, Atlanta, G. W. Hanson, manager, Flanders.
36—G. W. Varn, Valdosta, Ga., Cadillac.
37—Evelyn Harris, Southern Bell Telephone Company, Thomas.
38—W. G. Sutherlin, Atlanta, Overland.
39—Marvin R. McClatchey, Atlanta, White Gas.
40—F. G. Edwards, Albany, Ga., Chalmers.
41—Robinson Neckwear Company, Atlanta, Marmon.
42—Councilman Steve R. Johnson, Atlanta, Buick.
43—W. B. Cummings, Chief Atlanta Fire Department, Buick.
44—St. Elmo Massengale, advertising agency, Atlanta, Garford.
45—Boyd Perry, Atlanta, Ohio.
46—Gulf Refining Company, Atlanta, Mitchell.
47—Henry Meinert, Marietta, Maxwell.
48—Georgia Motor Car Company, Atlanta, Liberty Brush.
49—Georgia Motor Car Company, Atlanta, Everitt.
50—Swann & Campbell, Covington, Ga., Buick.
51—Herbert C. White, DeWitt, Ga., Maxwell.
52—William J. Davis, Atlanta, Pope-Hartford.
53—Muckalee Cigar Company, Americus, Cliff Clay, Marmon.

Contest Board Denies Wishart's Plea

Denying the appeal of Spencer Wishart, who drove a Mercedes car into second place at the late Fairmount Park road race, suffering disqualification by the referee for failure to carry his mechanic in the latter part of the run, the Contest Board of A. A. A. upheld the ruling of the race official and placed a Lozier car driven by Mulford second in the big race and first in its class.

The board disqualified and suspended Edson Card, Jr., for an indefinite period for conducting an unsanctioned meeting on election day, but absolves the registered drivers from blame as they were led to believe the affair had official sanction.

Frank P. Fox, registered driver, was suspended for a year for participating in an unsanctioned hill climb. H. D. Fisher, suspended for incompetence at Brighton Beach, July 3, moved for reconsideration of his case, which was denied.

George H. Clark, registered driver, who was suspended for two years for competing in an unsanctioned race meeting at Los Angeles under the name of E. Z. Martin, failed to have the ban raised by the board.

Good Roads Advocates in Session

RICHMOND, VA., Nov. 23—The first annual road congress held under the auspices of the American Association for Highway Improvement opened Monday for a meeting to cover four days. President Taft was unable to be present as expected, the reason being a severe cold. The attendance was large and representative and several of the debates were spirited. President Logan Waller Page presided at the sessions, which were held in the auditorium of the Jefferson hotel.

Monday was national day; Tuesday, states day and to-day is road users' day. To-morrow will be the most important session of the convention embracing many interesting phases of the preceding days.

Hoosiers Plan Southern Tour

ATLANTA, GA., Nov. 20—John Orman, secretary of the Indianapolis Auto Dealers' Association, has been prospecting about the South for several weeks of late primarily for the Premier Motor Vehicle Company, but incidentally with a view of finding out how this section would do as the scene of the next I. A. D. A. run, which is planned for next Summer.

"The South is just getting ready for the higher-priced cars and it is in this section especially that the Indiana dealers will have to look to dispose of their cars," he said. "I shall advocate a run through Louisville and Nashville to Atlanta, then over to Birmingham and back home again."

Spaces Allotted for N.A.A.M. Shows

FINAL allotments of show space for the exhibition of the National Association of Automobile Manufacturers in the Grand Central Palace have been made. There are still a few spaces that have not been definitely filled, but there are also several applications on file from which a selection will be made within a few days.

The following named companies have been added to the list or have had their original space allotments changed in one way or another: Regal Motor Car Company, main floor, space G; Columbus Buggy Company, main floor, space J-2; Gramm Motor Truck Company, main floor, space M-1; Kelly Motor Truck Company, main floor, space M-2. On the second floor are the following: Chase Motor Truck Company, space A-3; Universal Motor Truck Company, A-4; Westcott Motor Car Company, A-5; L. J. Bergdoll Motor Company, A-6; King Motor Car Company, A-7; Metz Company, A-8; L. E. Schlotterback Manufacturing Company, B-1; Newark Auto Manufacturing Company, B-2; Velie Motor Vehicle Company, C-1; Bowling Green Motor Car Company, C-2; Progress Development Company, C-3; Vandewater and Company, Ltd., D-2; Veerac Sales Company, D-3; Atterbury Motor Car Company, E-2; A. O. Smith Company, F-2; Stuyvesant Motor Car Company, H-2; Federal Motor Truck Company, H-5; Herreshoff Motor Company, H-6; G. H. Bushnell Press Company, J-4; Atlantic Motor Truck Company, J-5; Motor Wagon Company, K-3; Decatur Motor Car Company, K-4; Dayton Auto Truck Company, L-1; Lauth-Juergens Motor Car Company, L-2; Argo Electric Vehicle Company, L-3. Dart Manufacturing Company, M-1.

The list of car exhibitors, as revised to date, follows:

AUTOMOBILES—FIRST FLOOR

A-2 Clarke-Carter Auto Co., Jackson, Mich.
A-3 Imperial Auto Co., Jackson, Mich.
A-4 Ohio Electric Car Co., Toledo, Ohio.
A-5 Velie Motor Vehicle Co., Moline, Ill.
A-6 Velie Motor Vehicle Co., Moline, Ill.
A-7 W. A. Paterson Co., Flint, Mich.
B Hupp Corporation, Detroit, Mich.
C-2 Paige-Detroit Motor Car Co., Detroit, Mich.
D Fiat Auto Co., 1776 Broadway, New York.
E-1 Marion Motor Sales Co., Indianapolis, Ind.
E-2 Ideal Motor Car Co., Indianapolis, Ind.
E-3 Krit Motor Car Co., Detroit, Mich.
F-1 Cole Motor Car Co., Indianapolis, Ind.
F-2 Hupp Motor Car Co., Detroit, Mich.
F-3 Warren Motor Car Co., Detroit, Mich.
G Regal Motor Car Co., Detroit, Mich.
H Thomas B. Jeffery Co., Kenosha, Wis.
J-1 Kline Motor Car Corp., York, Pa.
J-2 Columbus Buggy Co., Columbus, Ohio.
K Abbott Motor Co., Detroit, Mich.
L-1 Haberer & Co., Cincinnati, Ohio.
M-1 Gramm Motor Truck Co., Lima, Ohio.
M-2 Kelly Motor Truck Co., Springfield, Ohio.
M-4 Auburn Auto Co., Auburn, Ind.
M-5 DeTamble Motors Co., Anderson, Ind.
N-1 Middleby Auto Co., Reading, Pa.
N-2 Lion Motor Car Co., Adrian, Mich.
O-1 McFarlan Motor Car Co., Connersville, Ind.
O-2 Great Western Auto Co., Peru, Ind.

SECOND FLOOR

A-3 Chase Motor Truck Co., Syracuse, N. Y.
A-4 Universal Motor Truck Co., Detroit, Mich.
A-5 Westcott Motor Car Co., Richmond, Ind.
A-6 Louis J. Bergdoll Motor Co., Philadelphia, Pa.
A-7 King Motor Car Co., Detroit, Mich.
A-8 Metz Co., Waltham, Mass.
B-1 L. E. Schlotterback Mfg. Co., East Orange, N. J.
B-2 Newark Auto Mfg. Co., Newark, N. J.
B-3 Sanford-Herbert Co., Syracuse, N. Y.
C-1 Velie Motor Vehicle Co., Moline, Ill.
C-2 Bowling Green Motor Car Co., Bowling Green, Ohio.
C-3 Progress Development Co., 126 Liberty St., New York.
D-2 Vandewater & Co., Ltd., Elizabeth, N. J.
D-3 Veerac Sales Co., Paterson, N. J.
E-2 Atterbury Motor Car Co., Buffalo, N. Y.
F-1 Walter Motor Truck Co., 49 West 61st St., New York.
F-2 A. O. Smith Co., Milwaukee, Wis.
G Wyckoff, Church & Partridge, Inc., 1743 Broadway, N. Y.
H-1 Standard Electric Car Co., Jackson, Mich.
H-2 Stuyvesant Motor Car Co., Cleveland, Ohio.
H-3 Walker Vehicle Co., Chicago, Ill.
H-4 Schacht Motor Car Co., Cincinnati, Ohio.
H-5 Federal Motor Truck Co., Detroit, Mich.
H-6 Herreshoff Motor Co., Detroit, Mich.
H-7 Packers Motor Truck Co., Wheeling, W. Va.
J-1 Sullivan Motor Car Co., Rochester, N. Y.
J-2 Cortland Motor Wagon Co., Pittsfield, Mass.
J-3 Lippard-Stewart Motor Car Co., Buffalo, N. Y.
J-4 G. H. Bushnell Press Co., Thompsonville, Conn.
J-5 Atlantic Motor Truck Co., 1818 Webster Ave., New York.
K-1 Durant-Dort Carriage Co., Flint, Mich.
K-2 Eclipse Truck Co., Franklin, Pa.
K-3 Motor Wagon Co., Detroit, Mich.
K-4 Decatur Motor Car Co., Decatur, Ind.
L-1 Dayton Auto Truck Co., Dayton, Ohio.
L-2 Lauth-Juergens Motor Car Co., Fremont, Ohio.
L-3 Argo Electric Vehicle Co., Saginaw, Mich.
M-1 Dart Mfg. Co., Waterloo, Iowa.

Where the Accessories Will Hold Forth

The list of accessory exhibitors on the third floor of the Palace includes the following:

A-1 United Rim Co., Akron, Ohio.
A-2 The Dean Electric Co., Elyria, Ohio.
A-3 Booth Demountable Rim Co., Cleveland, Ohio.
A-4 Standard Thermometer Co., Boston, Mass.
A-5 Motz Clincher Tire & Rubber Co., Akron, Ohio.
B-1 Lavigne Mfg. Co., Detroit, Mich.
B-2 Power Wagon Publishing Co., Chicago, Ill.
B-3 Grip Nut Co., Chicago, Ill.
B-4 Motor, 381 Fourth Ave., New York.
B-5 Modern Auto Appliances Co., Chatham, N. Y.
B-6 Wayne Oil Tank & Pump Co., Ft. Wayne, Ind.
B-7 Motor Vehicle Publishing Co., 24 Murray St., New York.
B-8 The S. K. F. Ball Bearing Co., 50 Church St., New York.
B-12 Peck Wheel Co., Chicago, Ill.
B-13 Horseless Age, 250 Reade St., N. Y. C.
C-1 Chas. E. Miller, 97 Reade St., N. Y. C.
D-1 Wm. Cramp & Son Ship & Engine Bldg. Co., Philadelphia, Pa.
D-2 General Electric Co., Schenectady, N. Y.
D-6 Timken-Detroit Axle Co., Detroit, Mich.
D-7 Oliver Mfg. Co., Chicago, Ill.
E-1 Automatic Motor & Engineering Co., Chicago, Ill.
E-2 The Class Journal Co. (Automobile), 239 W. 39th St., N. Y.
E-4 Calmon Asbestos & Rubber Wks. of America, 103 John St., N. Y.
E-5 Class Journal Co. (Motor Age), 239 West 39th St., N. Y.
E-7 Chilton Co., Philadelphia, Pa.
E-8 Automobile Journal Publishing Co., Pawtucket, R. I.
E-12 R. I. V. Co., 1771 Broadway, N. Y.
E-13 National Pump Co., Dayton, Ohio.
F-1 Narragansett Chemical Co., Providence, R. I.
G-2 Goodyear Tire & Rubber Co., Akron, Ohio.
H-1 U. S. Tire Co., 1790 Broadway, New York.
H-2 Ross Gear & Tool Co., Lafayette, Ind.
H-3 Muncie Gear Works, Muncie, Ind.
H-4 Edison Storage Battery Co., West Orange, N. J.
H-5 Adam Cook's Sons, 708 Washington St., New York.
J-1 Warner Instrument Co., Beloit, Wis.
J-2 Swinehart Tire & Rubber Co., Akron, Ohio.
J-3 Wheeler & Schebler, Indianapolis, Ind.
J-4 Empire Tire Co., Trenton, N. J.
J-5 The McCue Co., Hartford, Conn.
K-1 Diamond Rubber Co., Akron, Ohio.
K-2 S. F. Bowser & Co., Ft. Wayne, Ind.
K-3 B. F. Goodrich Co., Akron, Ohio.
L-1 Office M. & A. M.
L-2 Gray & Davis, Amesbury, Mass.
L-3 Firestone Tire & Rubber Co., Akron, Ohio.
M-1 Veeder Mfg. Co., Hartford, Conn.
M-2 Fisk Rubber Co., Chicopee Falls, Mass.
M-3 Breeze Carbureter Co., 250 South St., Newark, N. J.
M-4 Dorian Demountable Rim Co., 225 West 57th St., New York.
M-5 Hartford Suspension Co., 150 Bay St., Jersey City, N. J.
N-1 National Carbon Co., Cleveland, Ohio.
N-2 Pennsylvania Rubber Co., Jeannette, Pa.
N-3 Remy Electric Co., Anderson, Ind.
N-4 Gemmer Mfg. Co., Detroit, Mich.
N-5 Stromberg Motor Devices Co., Chicago, Ill.

New Palace to Seat 4,000 More than Garden

Official announcement of a preliminary character with regard to the building of a big show structure in New York city was made Tuesday, when Manager Spratt, of the Grand Central Palace, declared that the new structure which will be built south of the present building on Lexington avenue will approximate in shape and size the present Madison Square Garden. It will differ from that building, however, in one very important particular as it will be arranged to seat about 4,000 more than the present structure.

The plans have been prepared and at present they are being presented to the New York Central Railroad for approval.

It is intended that the new building shall be ready for occupancy by next Fall.

The three floors of Grand Central Palace, which will be used for the N. A. A. M. show have a floor space of 128,000 square feet. The new building, according to report, but not officially, will have an exhibition space of about 100,000 square feet. It is intended to connect the two structures by bridged passageways, so that they will be made available for one great show in two sections.

One of these will be available for the passenger automobiles and accessories and the other for trucks and accessories. Even under those conditions, space would appear to be at a premium. This may be accounted for by the increasing size of the trucks and the more numerous models in the passenger car lines. The Garden as it is now will barely accommodate all the lines of trucks that seek admission to the annual automobile shows held there, and while it might be possible to conduct a show equal to both weeks of the coming Board of Trade exhibition in one week, it would be found difficult to take care of all the standard cars of American motordom in any building in the world. Thus, the probabilities of the future point to the holding of two distinct shows, each continuing for one week. If this is done, New York will have buildings ample in size and facilities for holding such exhibitions.

The Final Line-Up at the Chicago Show

OFFICIAL and final allotments for the Chicago automobile show passenger vehicle section, of the National Association of Automobile Manufacturers, contain the following changes and additions: Warren Motor Car Company, First Regiment Armory, space G-1; Flanders Manufacturing Company, H-1. Coliseum basement: Westcott Motor Car Company, 2; Crow Motor Car Company, 3; L. J. Bergdoll Motor Company, 7; Colby Motor Company, 11; Lexington Motor Car Company, 12; Standard Electric Car Company, 14; King Motor Car Company, 16; George W. Davis Carriage Company, 17.

The complete list of exhibitors for the first week follows:

COLISEUM—AUTOMOBILES

A-1 Winton Motor Carriage Co., Cleveland, Ohio.
A-2 Thomas B. Jeffery Co., Kenosha, Wis.
A-3 H. H. Franklin Mfg. Co., Syracuse, N. Y.
A-4 Buick Motor Co., Flint, Mich.
A-5 Nordyke & Marmon Co., Indianapolis, Ind.
A-6 E-M-F Company, Detroit, Mich.
B-1 Woods Motor Vehicle Co., Chicago, Ill.
B-2 Locomobile Co. of America, Bridgeport, Conn.
B-3 Lozier Motor Co., Detroit, Mich.
B-4 Hudson Motor Car Co., Detroit, Mich.
B-5 Reo Motor Car Co., Lansing, Mich.
B-6 Olds Motor Works, Lansing, Mich.
C-1 Packard Motor Car Co., Detroit, Mich.
C-2 Pierce Arrow Motor Car Co., Buffalo, N. Y.
C-3 Stevens-Duryea Co., Chicopee Falls, Mass.
C-4 Chalmers Motor Co., Detroit, Mich.
C-5 National Motor Vehicle Co., Indianapolis, Ind.
C-6 Pope Mfg. Co., Hartford, Conn.
D-1 Maxwell-Briscoe Motor Co., New York.
D-2 Dayton Motor Car Co., Dayton, Ohio.
D-3 Premier Motor Mfg. Co., Indianapolis, Ind.
D-4 Cadillac Motor Car Co., Detroit, Mich.
D-5 Willys-Overland Co., Toledo, Ohio.
D-6 Peerless Motor Car Co., Cleveland, Ohio.
E-1 Brush Runabout Co., Detroit, Mich.
E-2 E. R. Thomas Motor Car Co., Buffalo, N. Y.
E-3 Pullman Motor Car Co., York, Pa.
E-4 Knox Automobile Co., Springfield, Mass.
F-1 Columbia Motor Car Co., Hartford, Conn.
F-2 White Company, Cleveland, Ohio.
F-3 Haynes Automobile Co., Kokomo, Ind.
F-4 Corbin Motor Vehicle Corp., New Britain, Conn.
G-1 Metzger Motor Car Co., Detroit, Mich.
G-2 Hupp Motor Car Co., Detroit, Mich.
H-1 Oakland Motor Car Co., Pontiac, Mich.
H-2 F. B. Stearns Co., Cleveland, Ohio.
I-1 Matheson Automobile Co., Wilkes-Barre, Pa.
K-1 Mitchell-Lewis Motor Car Co., Racine, Wis.
L-1 Abbott Motor Co., Detroit, Mich.

COLISEUM ANNEX—AUTOMOBILES

M-1 American Locomotive Co., 1886 Broadway, New York.
N-1 Cole Motor Car Co., Indianapolis, Ind.
O-1 Elmore Mfg. Co., Clyde, Ohio.
O-2 Baker Motor Vehicle Co., Cleveland, Ohio.
P-1 Ohio Electric Car Co., Toledo, Ohio.
O-1 American Motors Co., Indianapolis, Ind.
O-2 Selden Motor Vehicle Co., Rochester, N. Y.
Q-3 Bartholomew Co., Peoria, Ill.

FIRST REGIMENT ARMORY—AUTOMOBILES

A-1 Hupp Corporation, Detroit, Mich.
A-2 Waverly Co., Indianapolis, Ind.
A-3 Columbus Buggy Co., Columbus, Ohio.
A-4 Inter-State Automobile Co., Muncie, Ind.
B-1 Marquette Motor Co., Saginaw, Mich.
B-2 Moline Automobile Co., East Moline, Ill.
B-3 Rauch & Lang Carriage Co,, Cleveland, Ohio.
B-4 Case Threshing Machine Co., Racine, Wis.
C-1 Garford Co., Elyria, Ohio.
C-2 Anderson Electric Car Co., Detroit, Mich.
C-3 Simp'ex Motor Car Co., Mishawaka, Ind.
C-4 Cartercar Co., Pontiac, Mich.
D-1 Jackson Auto Co., Jackson, Mich.
D-2 Regal Motor Car Co., Detroit, Mich.
D-3 Austin Auto Co., Grand Rapids, Mich.
D-4 DeTamble Motors Co., Anderson, Ind.
E-1 Kissel Motor Car Co., Hartford, Wis.
E-2 Staver Carriage Co., Chicago, Ill.
E-3 Krit Motor Car Co., Detroit, Mich.
E-4 James Cunningham Son & Co., Rochester, N. Y.
E-5 Great Western Auto Co., Peru, Ind.
E-6 Fiat Automobile Co., 1776 Broadway, New York.
F-1 Clarke-Carter Auto Co., Jackson, Mich.
F-2 Imperial Auto Co., Jackson, Mich.
G-1 Warren Motor Car Co., Detroit, Mich.
G-2 W. H. McIntyre Co., Auburn, Ind.
G-3 Auburn Automobile Co., Auburn, Ind.
G-4 W. A. Paterson Co., Flint, Mich
G-5 McFarlan Motor Car Co., Connersville, Ind.
G-6 Moon Motor Car Co., St. Louis, Mo.
H-1 Flanders Mfg. Co., Pontiac, Mich.

COLISEUM BASEMENT—AUTOMOBILES

1 Ideal Motor Car Co., Indianapolis, Ind.
2 Westcott Motor Car Co., Richmond, Ind.
3 Crow Motor Car Co., Elkhart, Ind.
4 Borland-Grannis Co., Chicago, Ill.
5 Broc Electric Vehicle Co., Cleveland, Ohio.
6 Streator Motor Car Co., Streator, Ill.
7 L. J. Bergdoll Motor Co., Philadelphia, Pa.
8 Zimmerman Mfg. Co., Auburn, Ind.
9 Michigan Buggy Co., Kalamazoo, Mich.
10 Lion Motor Car Co., Adrian, Mich.
11 Colby Motor Co., Mason City, Ia.
12 Lexington Motor Car Co., Connersville, Ind.
13 Ohio Motor Car Co., Cincinnati, Ohio.
14 Standard Electric Car Co., Jackson, Mich.
15 Republic Motor Car Co., Hamilton, Ohio.
16 King Motor Car Co., Detroit, Mich.
17 George W. Davis Carriage Co., Richmond, Ind.
18 Schacht Motor Car Co., Cincinnati, Ohio.

COLISEUM GALLERY—ACCESSORIES

1 Hayes Mfg. Co., Detroit, Mich.
2-3 Motz Clincher Tire & Rubber Co., Akron, Ohio.
4 C. T. Ham Mfg. Co., Rochester, N. Y.
5-5a Kinsey Mfg. Co., Toledo, Ohio.
5b Standard Roller Bearing Co., Philadelphia, Pa.
6 Atwater-Kent Mfg. Works, Philadelphia, Pa.
7 Imperial Brass Mfg. Co., Chicago, Ill.
8-9 Michelin Tire Co., Milltown, N. J.
10 Driggs-Seabury Ordnance Corp., Sharon, Pa.
11 Warner Gear Co., Muncie, Ind.
12-13 Pennsylvania Rubber Co., Jeannette, Pa.
14 Remy Electric Co., Anderson, Ind.
15 Swinehart Tire & Rubber Co., Akron, Ohio.
16 Connecticut Telephone & Elec. Co., Meriden, Conn.
17 Wheeler & Schebler, Indianapolis, Ind.
18-19 Diamond Rubber Co., Akron, Ohio.
20 N. Y. & N. J. Lubricant Co., 165 Broadway, New York.
21 Jones Speedometer Co., Seventy-sixth and Broadway, New York.
22 Weed Chain Tire Grip Co., 28 Moore street, New York.
23 Whitney Mfg. Co., Hartford, Conn.
24 Briscoe Mfg. Co., Detroit, Mich.
25 R. E. Hardy Co., Chicago, Ill.
26-27 Ajax-Grieb Rubber Co., Fifty-seventh and Broadway, New York.
28 Standard Welding Co., Cleveland, Ohio.
29 American Ball Bearing Co., Cleveland, Ohio.
30-31 Republic Rubber Co., Youngstown, Ohio.
32 Timken-Detroit Axle Co., Detroit, Mich.
33 Timken Roller Bearing Co., Canton, Ohio.
34-35 Consolidated Rubber Tire Co., 20 Vesey street, New York.
36 McCord Mfg. Co., Detroit, Mich.
37 A. R. Mosler & Co., 103 West Twenty-ninth street, New York.
38-39 Fisk Rubber Co., Chicopee Falls, Mass.
40 National Carbon Co., Cleveland, Ohio.
41 Badger Brass Mfg. Co., Kenosha, Wis.
42 Veeder Mfg. Co., Hartford, Conn.
43 Hartford Rubber Works Co., Hartford, Conn.
44 Continental Caoutchouc Co., 1790 Broadway, New York.
45 G. & J. Tire Co., 1790 Broadway, N. Y.
Morgan & Wright, 1790 Broadway, New York.
46 Gray & Davis, Amesbury, Mass.
47-48 B. F. Goodrich Co., Akron, Ohio.
49 C. F. Splitdorf, 265 Walton avenue, New York.
50 National Tube Co., Pittsburgh, Pa.

51-52 Goodyear Tire & Rubber Co., Akron, Ohio.
53 Herz & Co., 187 Elm street, New York.
54 Diamond Chain & Mfg. Co., Indianapolis, Ind.
55 Wm. Cramp & Sons Ship & Engine Bldg. Co., Philadelphia, Pa.
56 Vesta Accumulator Co., Chicago, Ill.
57 J. H. Williams Co., Brooklyn, N. Y.
58 A. W. Harris Oil Co., Providence, R. I.
59-60 Hartford Suspension Co., Jersey City, N. J.
61 Baldwin Chain & Mfg. Co., Worcester, Mass.
62 Continental Motor Mfg. Co., Muskegon, Mich.
63 Spicer Mfg. Co., Plainfield, N. J.
64 Pittsfield Spark Coil Co., Dalton, Mass.
65 Brown-Lipe Gear Co., Syracuse, N. Y.
66 Weston-Mott Co., Flint, Mich.
67-68 Firestone Tire & Rubber Co., Akron, Ohio.
69a Royal Equipment Co., Bridgeport, Conn.
69b Electric Storage Battery Co., Philadelphia, Pa.
70 Oliver Mfg. Co., Chicago, Ill.
71-72 S. F. Bowser & Co., Fort Wayne, Ind.
73 Edmunds & Jones Mfg. Co., Detroit, Mich.
74 Kokomo Electric Co., Kokomo, Ind.
75 Byrne, Kingston & Co., Kokomo, Ind.
76a U. S. Light & Heating Co., 30 Church street, New York City.
76 Stromberg Motor Devices Co., Chicago, Ill.

COLISEUM ANNEX, SECOND FLOOR—ACCESSORIES

77 Isaac G. Johnson & Co., Spuyten Duyvil, New York City.
78 Dean Electric Co., Elyria, Onio.
79 Gabriel Horn Mfg. Co., Cleveland, Ohio.
80 A. O. Smith Co., Milwaukee, Wis.
81 Voorhees Rubber Co., Jersey City, N. J.
82 Auto Parts Mfg. Co., Muncie, Ind.
83 Eisemann Magneto Co., New York City.
84 W. H. Leland & Co., Worcester, Mass.
85 Muncie Gear Works, Muncie, Ind.
86 Leather Tire Goods Co., Niagara Falls, N. Y.
87 American Circular Loom Co., Boston, Mass.
88 Covert Motor Vehicle Co., Lockport, N. Y.
89 Link-Belt Co., Indianapolis, Ind.
90 Gemmer Mfg. Co., Detroit, Mich.
91 Havoline Oil Co., New York City.
92 Champion Ignition Co., Flint, Mich.
93 Detroit Electric Appliance Co., Detroit, Mich.
94 Auburn Auto Pump Co., Boston, Mass.
95 Heinze Electric Co., Lowell, Mass.
96 Booth Demountable Rim Co., Cleveland, Ohio.
97 Lovell-McConnell Mfg. Co., Newark, N. J.
98 Apple Electric Co., Dayton, O.
99 Bosch Magneto Co., New York City.
100 Sparks-Withington Co., Jackson, Mich.
101 Lee Tire & Rubber Co., Conshohocken, Pa.
102 Warner Mfg. Co., Toledo, Ohio.
103 Turner Brass Works, Sycamore, Ill.
104 National Coil Co., Lansing, Mich.
105 Ross Gear & Took Co., Lafayette, Ind.
106 Edison Storage Battery Co., West Orange, N. J.
107 Federal Rubber Co., Cudahy, Wis.
108 Stewart & Clark Mfg. Co., Chicago, Ill.
109 Empire Tire Co., Trenton, N. J.
110 Buda Co., Harvey, Ill.
111 Stutz Auto Parts Co., Indianapolis, Ind.
112 United Rim Co., Akron, Ohio.
113 Briggs & Stratton Co., Milwaukee, Wis.
114 George A. Haws, New York City.
115 General Electric Co., Schenectady, N. Y.
116 Jacobson & Brandlow, Pittsfield, Mass.
117 Dorian Remountable Rim Co., New York City.
118 Waukesha Motor Co., Waukesha, Wis.
119 International Acheson Graphite Co., Niagara Falls, N. Y.
120 Esterline Co., Lafayette, Ind.
121 Falls Machine Co., Sheboygan Falls, Wis.
122 Simms Magneto, New York City.
123 Western Motor Co., Marion, Ind.
124 Warner Instrument Co., Beloit, Wis.
125 Valentine & Co., New York City.
126 Batavia Rubber Co., Batavia, N. Y.
127 Gray-Hawley Mfg. Co., Detroit, Mich.
128 Avery Portable Lighting Co., Milwaukee, Wis.
129 J. H. Sager Co., Rochester, N. Y.
130 Jos. Dixon Crucible Co., Jersey City, N. J.
131 Globe Machine & Stamping Co., Cleveland, Ohio.
132 Adam Cook's Sons, New York City.
133 Hoffecker Co., Boston, Mass.
134 C. Cowles & Co., New Haven, Conn.
135 Columbia Lubricants Co., New York City.
136 C. A. Shaler Co., Waupun, Wis.
137 Pantasote Co., New York City.
138 Sprague Umbrella Co., Norwalk, Conn.
139 Continental Rubber Works, Erie, Pa.
140 Start-Lite Co., Chicago, Ill.
141 Universal Tire Protector Co., Angola, Ind.
142 Auto Supply Mfg. Co., Brooklyn, N. Y.
143 Double Fabric Tire Co., Auburn, Ind.
144 Hess Spring & Axle Co., Carthage, Ohio.
145 Dochler Die Casting, Brooklyn, N. Y.
146 G. Piel Co., Long Island City, N. Y.
147 Universal Wind Shield Co., Chicago, Ill.
148 Wolverine Lubricating Co., New York City.
149 Allen Auto Specialty Co., New York City.
150 Willard Storage Battery Co., Cleveland, Ohio.
151 Kellogg Mfg. Co., Rochester, N. Y.
152 Western Tool & Forge Co., Brackenridge, Pa.
153 Dover Stamping & Mfg. Co., Cambridge, Mass.
154 Stein Double Cushion Tire Co., Akron, Ohio.

FIRST REGIMENT ARMORY GALLERY—ACCESSORIES

1 The Horseless Age, 250 West Fifty-fourth street, New York.
2 Atlas Chain Co., Brooklyn, N. Y.
3 C. O. Tingley & Co., Rahway, N. J.
4 Barco Brass & Joint Co., Chicago, Ill.
5 Detroit Lubricator Co., Detroit, Mich.
6 Perfection Spring Co., Cleveland, Ohio.
7 U. S. Ball Bearing Mfg. Co., Oak Park, Ill.
8 The Lefever Arms Co., Syracuse, N. Y.
9 The Eagle Co., Newark, N. J.
10 The Mayo Mfg. Co., Chicago, Ill.
11 C. M. B. Wrench Co., Syracuse, N. Y.
12 Motor Vehicle Publishing Co., New York City.
13 Rhineland Machine Works Co., New York City.
14 Automatic Motor & Engineering Co., Chicago, Ill.
15 International Metal Polish Co., Indianapolis, Ind.
16 National Motor Supply Co., Cleveland, Ohio.
17 Wisconsin Motor Mfg. Co., Milwaukee, Wis.
18 S. Hoffnung & Co., New York City.
19 Findeisen & Kropf Mfg. Co., Chicago, Ill.
20 The Brown Co., Syracuse, N. Y.
21a Selbach Rubber Co., Boston, Mass.
21b Martel Blow-Out Protector Co., Chicago, Ill.
22 Sheldon Axle Co., Wilkes-Barre, Pa.
23 Peck Wheel Co., Chicago, Ill.
24 S. Breakstone, Chicago, Ill.
25 K-W Ignition Co., Cleveland, Ohio.
26 Perfect Window Regulator Co., New York City.
27 E. Edelmann & Co., Chicago, Ill.
28 Standard Varnish Works, Chicago, Ill.
29 Keystone Lubricating Co., Chicago, Ill.
30 *Motor*, New York City.
31 Frank Mossberg Co., Attleboro, Mass.
32 Norton Grinding Co., Worcester, Mass.
33 Morrison-Ricker Mfg. Co., Grinnell, Ia.
34 Chilton Co., Philadelphia, Pa.
35 The Class Journal Co., New York City (for *Motor Age*).
36 Longdin & Brugger Co., Fond du Lac, Wis.
37 The Troy Carriage Sun Shade Co., Troy, Ohio.
38 The Model Gas Engine Co., Peru, Ind.
39 Shawmut Tire Co., Boston, Mass.
40 Class Journal Co., New York City (for AUTOMOBILE).

Commercial Week at Chicago

The commercial section of the Chicago show has also undergone some changes and additions which are as follows: White Company, main floor Coliseum, space A-3; Avery Company, C-2; Morgan Motor Truck Company, M-1; Clark Delivery Car Company, M-2; Harder Fireproof Storage and Van Company, N-1. Coliseum Annex: Atterbury Motor Car Company, P-2. First Regiment Armory, main floor: Wyckoff, Church and Partridge, Inc., A-1 and A-3; Four-Wheel Drive Auto Company, B-1; Sanford-Herbert Company, B-2; Chicago Commercial Car Company, B3; A. O. Smith Company, B-6; Motor Wagon Company, C-3; Buick Motor Company, C-4; Harwood-Barley Manufacturing Company, D-3; Mercury Manufacturing Company, D-4; H. E. Wilcox Motor Car Company, D-5; Speedwell Motor Car Company, E-1; Velie Motor Vehicle Company, E-2; Poss Motor Company, E-3; Commerce Motor Car Company, F-2; Service Motor Car Company, G-2; Monitor Auto Works, G-3.

The revised list of exhibitors follows:

COLISEUM—MAIN FLOOR—AUTOMOBILES

A-1 Thomas B. Jeffery Co., Kenosha, Wis.
A-2 Baker Motor Vehicle Co., Cleveland, Ohio
A-3 White Co., Cleveland, Ohio.
A-4 Mack Bros. Motor Car Co., Allentown, Pa.
B-1 Rapid Motor Vehicle Co., Pontiac, Mich.
B-2 Reo Motor Car Co., Lansing, Mich.
B-3 Kelly Motor Truck Co., Springfield, Ohio.
B-4 Grabowsky Power Wagon Co., Detroit, Mich.
B-5 Pope Mfg. Co., Hartford, Conn.
C-1 Packard Motor Car Co., Detroit, Mich.
C-2 Avery Co., Peoria, Ill.
C-3 F. B. Stearns Co., Cleveland, Ohio.
C-4 Locomobile Co. of America, Bridgeport, Conn.
C-5 Cartercar Co., Pontiac, Mich.
C-6 Waverly Co., Indianapolis, Ind.
D-1 Garford Co., Elyria, Ohio.
D-2 Peerless Motor Car Co., Cleveland, Ohio.
D-3 Metzger Motor Car Co., Detroit, Mich.
D-4 Brush Runabout Co., Detroit, Mich.
D-5 Knox Automobile Co., Springfield, Mass.
D-6 Gramm Motor Car Co., Lima, Ohio.
E-1 American Locomotive Co., 1886 Broadway, New York.
E-2 Anderson Electric Car Co., Detroit, Mich.
E-3 Schmidt Bros. Co., Chicagd, Ill.
F-1 Kissel Motor Car Co., Hartford, Wis.
F-2 Pierce-Arrow Motor Car Co., Buffalo, N. Y.
G Reliance Motor Truck Co., Owosso, Mich.
H General Motors Co., Detroit, Mich.
J Staver Carriage Co., Chicago, Ill.
K Lozier Motor Co., Detroit, Mich.
L W. H. McIntyre Co., Auburn, Ind.
M-1 Morgan Motor Truck Co., Worcester, Mass.
M-2 Clark Delivery Car Co., Grand Crossing, Chicago.
N-1 Harder Fireproof Storage & Van Co., Chicago.
N-2 Federal Motor Truck Co., Detroit, Mich.
N-3 Adams Bros. Co., Findlay, Ohio.

COLISEUM ANNEX—MAIN FLOOR—AUTOMOBILES

O Eclipse Truck Co., Franklin, Pa.
P-1 Alden-Sampson Mfg. Co., Detroit, Mich.
P-2 Atterbury Motor Car Co., Buffalo, N. Y.
Q-1 Durant-Dort Carriage Co., Flint, Mich.
Q-2 U. S. Motor Truck Co., Cincinnati, Ohio.
Q-3 Dayton Auto Truck Co., Dayton, Ohio.
Q-4 Dorris Motor Car Co., St. Louis, Mo.
R Mais Motor Truck Co., Indianapolis, Ind.
S General Vehicle Co., Long Island City, N. Y.

FIRST REGIMENT ARMORY—MAIN FLOOR—AUTOMOBILES

A-1 Wyckoff, Church & Partridge, Inc., New York.
A-2 Walker Vehicle Co., Chicago, Ill.

A-3 Wyckoff, Church & Partridge, Inc., New York.
A-4 Stegeman Motor Car Co., Milwaukee, Wis.
B-1 Four-Wheel Drive Auto Co., Clintonville, Wis.
B-2 Sanford-Herbert Co., Syracuse, N. Y.
B-3 Chicago Commercial Car Co., Chicago, Ill.
B-4 Lauth-Juergens Motor Car Co., Fremont, Ohio.
B-5 Packers Motor Truck Co., Wheeling, W. Va.
B-6 A. O. Smith Co., Milwaukee, Wis.
C-1 Sternberg Mfg. Co., Milwaukee, Wis.
C-2 Henry Lee Power Co., Chicago, Ill.
C-3 Motor Wagon Co. of Detroit, Detroit, Mich.
C-4 Buick Motor Co., Flint, Mich.
D-1 National Motor Truck Co., Bay City, Mich.
D-2 Universal Motor Truck Co., Detroit, Mich.
D-3 Harwood-Barley Mfg. Co., Marion, Ind.
D-4 Mercury Mfg. Co., Chicago, Ill.
D-5 H. E. Wilcox Motor Car Co., Minneapolis, Minn.
E-1 Speedwell Motor Car Co., Dayton, Ohio.
E-2 Velie Motor Vehicle Co., Moline, Ill.
E-3 Poss Motor Co., Detroit, Mich.
F-1 Schacht Motor Car Co., Cincinnati, Ohio.
F-2 Commerce Motor Car Co., Detroit, Mich.
G-2 Service Motor Car Co., Wabash, Ind.
G-3 Monitor Auto Works.

The changes in the list of accessory exhibitors for commercial week are as follows:

COLISEUM

1 Model Gas Engine Works, Peru, Ind.

FIRST REGIMENT ARMORY—ACCESSORIES

3-4 Marburg Bros., Inc., 1777 Broadway, New York.
9 Merchant & Evans Co., Philadelphia, Pa.
10 The Punctureless Tire Co. of Illinois, Chicago, Ill.
11 The Garage Equipment Mfg. Co., Milwaukee, Wis.
12 Torbenson Gear & Axle Co., Bloomfield, N. J.
14-15 The Aristos Co., 250 West Fifty-fourth street, New York.
16 Milwaukee Oil Pump & Tank Co., Milwaukee, Wis.
20 Automobile Journal Publishing Co., Pawtucket, R. I.
21 American Bronze Co., Berwyn, Pa.
23 Power Wagon Publishing Co., Chicago, Ill.
24 Michigan Magneto Co., 117 Bagley avenue, Detroit, Mich.
25-26 Lavigne Mfg. Co., Detroit, Mich.
27 The John L. G. Dykes Co., 222 North State street, Chicago, Ill.
28 Clucker & Hixson Co., 32 Park Place, New York.
31 Van Cleef Bros., 7711 Woodlawn avenue, Chicago, Ill.
33 Chicago Steel Foundry Co., Chicago, Ill.
36 Hydraulic Oil Storage Co., Detroit, Mich.
39 Dayton Engineering Laboratories Co., Dayton, Ohio.

MOTORCYCLE SECTION—COLISEUM ANNEX

79 Minneapolis Motor Cycle Co., Minneapolis, Minn.
80-81 Flanders Mfg. Co., Pontiac, Mich.
94-95 Aurora Auto Machinery Co., Thor Bldg., Chicago, Ill.
96 Bicycling World Co., Tribune Bldg., New York City.
113 Hawthorne Mfg. Co., Inc., Bridgeport, Conn.
114 The Henderson Motorcycle Co., Detroit, Mich.
117 Nathan Novelty Mfg. Co., 84 Reade street, New York City.
124-125-126 Harley-Davidson Motor Co., Milwaukee, Wis.
127-128-129 Consolidated Mfg. Co., Toledo, Ohio.
130 Wagner Motorcycle Co., St. Paul, Minn.
131-132 Excelsior Supply Co., Chicago, Ill.
133-134-135 Reading Standard Co., Reading, Pa.
136-137-138-139 The Hendee Mfg. Co., Springfield, Mass.
140 Motorcycle Publishing Co., 51 Chambers street, New York City.
141 Motorcycling, Chicago, Ill.
142-143-144 New Era Autocycle Co., Dayton, Ohio.
145-146 The Pope Mfg. Co., Hartford, Conn.
147-148-149-150 Emblem Mfg. Co., Angela, N. Y.
151-152 The Pierce Cycle Co., Buffalo, N. Y.
153-154-155 The Miami Cycle & Mfg. Co., Middletown, Ohio.

Cleveland Show Gets Club Sanction

CLEVELAND, OHIO, Nov. 20.—A meeting of directors of the Cleveland Automobile Show Company was held recently and a committee to manage the 1912 show was chosen consisting of the following: Frank W. Phillips, H. M. Adams, C. N. Brockway, Ray M. Colwell and Fred C. Wood.

This show committee will manage the coming season's show with the sanction and assistance of the Cleveland Automobile Club.

Fred H. Caley, secretary of the Cleveland Automobile Club, will act as assistant secretary and the offices will be in the Hollenden Hotel.

Big Exhibition Planned at Baltimore

BALTIMORE, MD., Nov. 20.—The Automobile Club of Maryland and the Baltimore Automobile Dealers' Association have decided upon February 20 to 28 for the next motor car show to be held in this city. The only thing holding back the rushing of the plans is the answer to the application of the two organizations forwarded to Major Washington Bowie, Jr., of the board of trustees of the Fifth Regiment Armory for use of the armory. Both bodies have announced that the coming show will be run on larger plans than ever before and for this reason they are beginning arrangements earlier than usual.

Garden Truck Show to Have 231 Exhibitors

Plans and preparations already made for the second annual display of motor trucks and delivery wagons to be held in Madison Square Garden, New York, during the second week of the Twelfth National Automobile Show, January 15 to 20 inclusive, indicate plainly that the commercial week will be a close second to passenger car week in magnitude and interest. Every square foot of space utilized the first week has been sold for the following week to thirty-one manufacturers of trucks and delivery wagons, and two hundred motor car accessories makers.

Business machines of all types and sizes will be displayed, ranging from package delivery cars of about 600 pounds capacity to 10-ton trucks. There will be twenty-seven makes of gasoline machines and eleven makes of electric wagons. Besides the ordinary styles of trucks and delivery wagons, there will be many machines for special purposes, such as motor fire engines, patrol wagons, ambulances, trucks with tipping bodies and trucks with power winches for hoisting purposes.

Fall Show at Indianapolis

INDIANAPOLIS, IND., Nov. 20—Members of the Indianapolis Automobile Trade Association are holding their first Fall show this week. Each member is exhibiting in his own place of business and the different salesrooms are beautifully decorated for the week. A special feature is a free 'bus service for taking visitors from one salesroom to another. There are forty-three cars in this service for the week, loaned by members of the association.

Thursday afternoon has been selected as "Ladies' Day" and during the afternoon special attention will be given to the display of electrics, coupés, limousines and other closed body cars.

Show at Canadian Capital

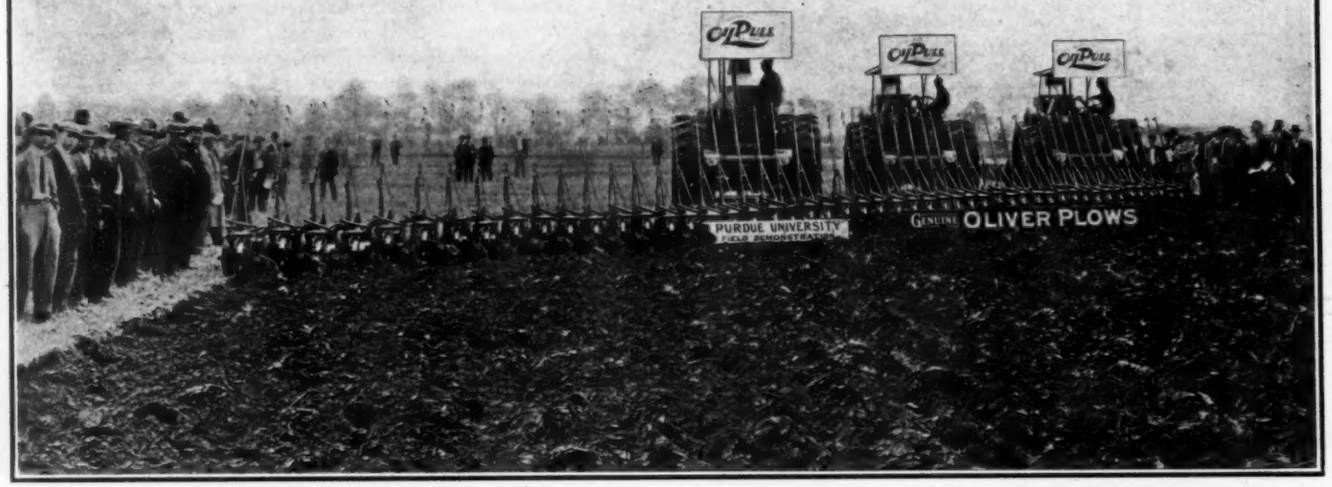
OTTAWA, CAN., Nov. 20—Ottawa's first annual automobile show will be held April 6 to 13, 1912 in Howich Hall, under the auspices of Ottawa Valley Motor Car Association. Howich Hall is the largest building in the city comprises about 40,000 square feet, half of which has already been sold. The Governor-General Foot Guard's Band has been engaged to furnish music during the show. The show committee has made plans to have the decorative feature of the show the best ever seen in Canada. Louis Blumenstein has been engaged as manager, with offices at 49 Metcalf street, Ottawa, Canada.

Akron Is Actually Building Roads

AKRON, OHIO, Nov. 20—The result of the past two years' good road building activity in this vicinity shows that within a short time there will be three brick roads connecting Akron and Cleveland, a distance of 35 miles, and Akron and Canton on the south, making an improved straightaway road more than 50 miles in length through beautiful touring territory. In Cuyahoga county, of which Cleveland is the county seat, there are already brick roads in all directions from the city to the county line, including two in the general direction of Akron.

Pavement from Akron north to connect with one of the Cleveland roads is already nearly done, and plans are for another big road building year in 1912. Summit county has completed 31 1-2 miles of country road paving this year. Twenty-five miles more are covered by the petitions filed with the county commissioners for next year.

NEWS of the WEEK CONDENSED



Plowing demonstration recently given at Purdue University with three oil-pull tractors and fifty plows

SOUTH BEND, IND.—Three Rumely oil-pull tractors and fifty Oliver plows broke the world's record for plowing recently in a demonstration at Purdue University, Lafayette, Ind. The demonstration was arranged by Joseph D. Oliver, president of the Oliver Chilled Plow Works and also a trustee of Purdue, and President Stone of the university. Sections of the mammoth Oliver plow were hauled into place, and W. L. Paul, designer of the big fifty-bottom sectional plow, dropped the plows across the end of the field in an exact line. They turned the stubble field at the rate of 1 acre every 4 minutes and 15 seconds. The strip plowed was 58 feet 4 inches wide. The engines were operated on a low grade of kerosene distillate costing 4 cents a gallon. The three engines consumed 22 gallons an hour, reducing the fuel cost to less than 6½ cents an acre.

BEAVER CITY, NEB.—A new garage is being erected here by Birsell & Son.

ST. PAUL, NEB.—Charles Guggenman has taken the agency for the Hudson in this territory.

OCALA, FLA.—Work has begun on the erection of a $10,000 garage for R. L. Anderson.

BATTLE CREEK, NEB.—Fuerst and Huerman will erect a new garage here in the near future.

WYMORE, NEB.—The Lyons Automobile Company has bought out the automobile business of E. W. Severance & Son.

ABERDEEN, WASH.—J. B. Knight is handling the Mitchell car in the Gray's Harbor country, with headquarters in this city.

CORNING, N. Y.—The Corning Automobile Company has leased the Hillman Garage at Wall street and Tioga avenue. Max Wolcott is manager of the company.

BOSTON, MASS.—F. L. Sanford has joined the sales force of the Henley-Kimball Company, and is in charge of the wholesale department for outside territory on Hudson cars.

NEW YORK CITY—The Hexter Motor Truck Company of New York, metropolitan distributor for the Gramm, is erecting a service maintenance building at 155-159 Perry street.

BUFFALO, N. Y.—William J. Clements, formerly manager of the Detroit branch of the Krit Motor Car Company, has been promoted to the position of manager of the company's branch in this city.

CHICOPEE FALLS, MASS.—A. M. Welch, formerly with the Studebaker Company, and for the past year manager of the Commercial Car Department of the Franklin works at Syracuse, N. Y., has taken up territorial work with the Stevens-Duryea Company, of this city.

PITTSBURGH, PA.—H. L. Mason, Jr., was recently elected president of the Automobile Club of Pittsburgh, to succeed Edward Kneeland, who resigned on account of the pressure of other business. Mr. Mason will remain in office until the annual election on February 1.

NEW YORK CITY—Fred W. Wright, of No. 250 West Fifty-fourth street, who recently took the local agency for the Lion car, has placed agencies with the Watson Automobile Company, of Fishkill, N. Y.; John S. Carpenter, of Goshen, N. Y., and the McFarlan-Brooklyn Company, of Brooklyn, N. Y.

NEW YORK CITY—The city fire department is soon to be augmented by a monster self-propelling pumping engine which will make up to 40 miles an hour and throw 700 gallons of water a minute. The engine is about 18 feet long, with a wheel-base of 146 inches. It weighs, complete, nearly 7 tons and runs on 42-inch wheels with solid tires.

YORK, NEB.—The York Automobile Club is taking an active part in pushing the Canada-to-Gulf route, known here as the Meridian road. It is proposed that the road run through York, and the members of the club have all been assessed $5 to support the project. It was voted to use the club money to purchase markers for the road through the county.

PORTLAND, ORE.—Several new Mitchell agencies have been placed in the Northwest during the past month. Among them are: the Ellensburg Auto Company, of Ellensburg, Wash., the Milton Garage of Milton, Ore., and the Simonton Motor Company, of Salem, Ore. The Mitchell will be represented in this city by the firm of Dulmage & Smith, who have recently erected a large garage and salesroom.

INDIANAPOLIS, IND.—The Ocean-to-Ocean booklet, containing 108 illustrations and telling in detail the story of the transcontinental tour of 12 Premier cars, has found a place in the public schools of this city. John G. Monihan, secretary of the 40 tourists who crossed the continent last summer, has received thousands of requests for these booklets, many of which have come from teachers and librarians.

WASHINGTON, D. C.—E. T. Howard has joined the sales force of the Marion Motor Car Company.

CHARLESTON, W. VA.—A company has been organized to manufacture automobile trucks in this city.

SHEBOYGAN, WIS.—Dr. H. A. Wagner and M. G. Dohme are building a garage at 1519 North Sixth street.

LOS ANGELES, CAL.—The Michigan car has been introduced into Southern California by C. L. Perrin, who has opened an agency.

DALLAS, TEX.—W. G. Langley, the local agent for the Franklin, recently opened a new garage at 1713 Commerce street in this city.

TORONTO, ONT.—The Gem City Garage Company is enlarging its present building by the addition of a well-equipped machine and repair shop.

UTICA, N. Y.—The Oneida Garage Company, George A. McCracken general manager, will erect a two-story concrete garage at 215 Park avenue.

WILMINGTON, DEL.—W. D. Haddock & Co. have secured the contract for the construction of a garage to be built for the Wilmington Steamboat Company.

JANESVILLE, WIS.—Edward Kemmerer has commenced work on the construction of a brick and steel garage building to contain 15,000 square feet of floor space.

MINNEAPOLIS, MINN.—L. H. Fawkes is to erect a three-story brick and reinforced concrete automobile warehouse at 1629 Hennepin avenue. It will cost $35,000.

ST. LOUIS, MO.—A. H. Collins, sales manager of the Herreshoff Motor Company, of Detroit, has closed with George E. Maguire for St. Louis and surrounding territory.

WASHINGTON, D. C.—Additional territory has been assigned to W. P. Barnhart, local representative of the Everitt car. The new field covers the states of Virginia and North Carolina.

AKRON, O.—E. I. Whorley, formerly branch manager of the Dallas, Tex., branch of the B. F. Goodrich Company, has accepted a position with the Motz Tire & Rubber Company, of this city.

SEATTLE, WASH.—J. M. Stehman, formerly with J. E. Leavitt & Company, is now connected with the Mitchell Motor Car Company of this city. He will represent the company in all the Northwest territory outside of Seattle.

NEW YORK CITY.—The Eastern and Central district branch managers and salesmen of the United States Tire Company held a meeting here recently. An all-day business session was followed by a dinner at the Hotel Astor.

SALEM, O.—T. A. Vernon has sold half interest in his garage on Ellsworth avenue to E. A. Saren, of Alliance, O. Mr. Saren has taken active management of the garage though Mr. Vernon retains his district agency for the Everitt car.

MOLINE, ILL.—John E. Miller, chief engineer of the Midland Motor Company, of this city, and designer of the Moline car, was killed recently while crossing a railroad track just outside of the Midland factory yards at East Moline, Ill.

SCRANTON, PA.—John H. Felming, proprietor of the city hall garage, 330-336 Dix court, has acquired the distributing rights in Luzerne county and northeastern Pennsylvania for the American cars built by the American Motors Company, of Indianapolis, Ind.

PROVIDENCE, R. I.—According to the table of automobile trucks just compiled by the American Locomotive Company, 62 per cent. of all the trucks have been purchased on repeat orders and 78 per cent. of those in the service of department stores are re-orders.

SEATTLE, WASH.—William O. McKay, a University of Washington man, and J. D. Thomas, will open a Locomobile agency in this city. The Thomas-McKay Company, Inc., will have temporary quarters at 211 Broadway north. Mr. Thomas intends to erect a large garage in the near future.

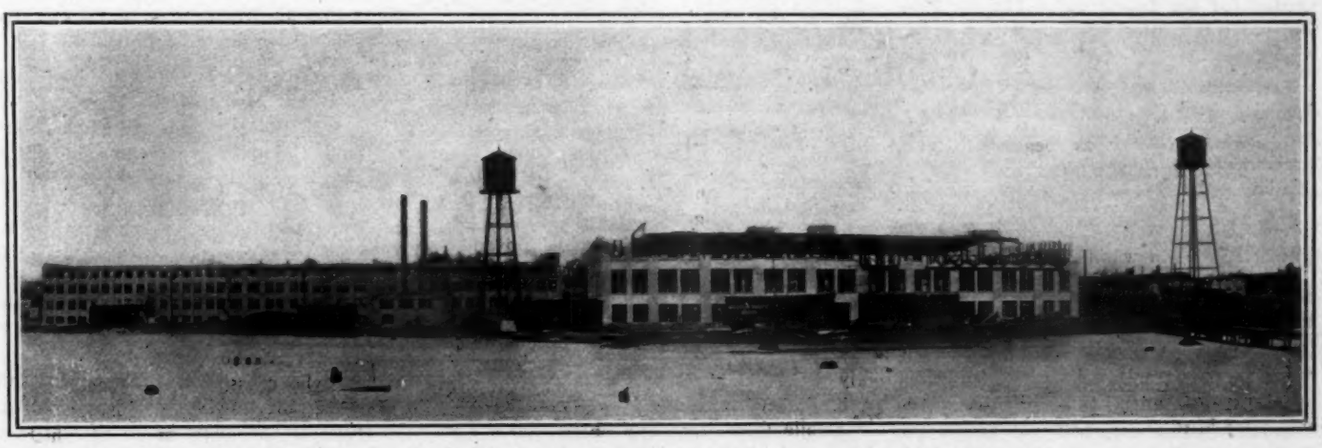
LOS ANGELES, CAL.—Joe Ollier, manager of the southern California branch of the Studebaker Bros. corporation, has announced the formal moving of the local branch to the new building at 1620-22-24 East Seventh street. The R. C. H. Sales Agency will occupy the quarters recently vacated by the Studebaker Company.

LOS ANGELES, CAL.—Tiring of the monotony of railroad travel, A. N. King and wife, an aged couple of Anderson, Ind., purchased a Maxwell runabout and drove from Anderson to their Winter home near here, covering more than 3,000 miles. Part of the time was spent in camping on the road and the balance as guests of ranchers.

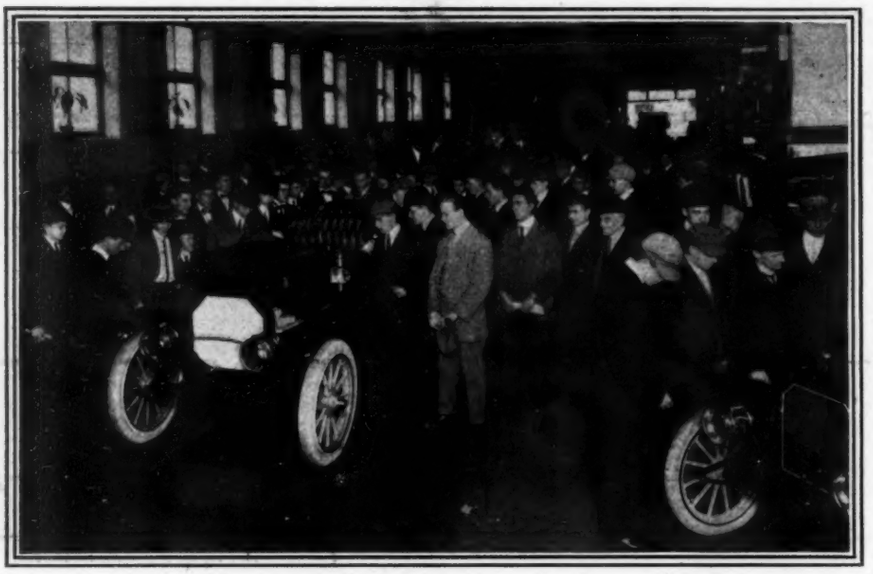
BOSTON, MASS.—The latest acquisition of Sampson automobile trucks by the New England Telephone & Telegraph Company gives that organization a total of twenty machines—17 of 3,000 pounds capacity, 2 of 1,500 pounds and 1, the first purchased, of 4 tons. The fleet operates between a central station in this city and various stations throughout the State.

HARTFORD, WIS.—The construction work on the new addition to the KisselKar plant is rapidly progressing. The new structures, which will be under cover within thirty days, consist of a three-story concrete building, 107 by 407 feet, and a one-story building, 50 by 407 feet. Additional machinery and equipment are being rapidly installed and the factory will be equipped with an electric trolley system for economically transporting all machinery and parts from one department to another.

RACINE, WIS.—Papers have been filed in the suit of the Knox Automobile Company, of Springfield, Mass., against William A. Crane, of this city, to recover on a $10,000 bond given by Mr. Crane in behalf of his son, George R. Crane, of Milwaukee, in 1904, upon acceptance of the Knox agency in a large territory contiguous to Milwaukee and Chicago. In October, 1906, the younger Crane went into voluntary bankruptcy, among the liabilities being $13,666.34 due the Knox company. He was discharged from bankruptcy in February, 1907. The complaint of the Knox company states that Crane handled $139,000 worth of cars while he represented it in Milwaukee.



The new addition to the KisselKar plant at Hartford, Wis., will be under cover in thirty days



Group of Y. M. C. A. students inspecting Maxwell cars at the New York branch

LOUISVILLE, NEB.—The garage of William Vlok has been purchased by Haney Brothers.

SAN DIEGO, CAL.—The Bowler Motor Car Company is now the local agent for the Cole car.

SHEBOYGAN, WIS.—Arthur F. Raab, 809 North Eighth street, is a new agent for the Sampson 35.

SAN DIEGO, CAL.—The Hunt Automobile Company of this city has secured the agency for the Overland car.

DAVID CITY, NEB.—The David City Auto Company's new garage has been completed recently and is now in operation.

SAN DIEGO, CAL.—The Bay City Garage of Fifth and Ash streets, has recently taken the agency for the Everitt car in this vicinity.

PORTLAND, ORE.—L. A. Harding, president of the Nob Hill Garage & Auto Company, has taken the local agency for the American.

DES MOINES, IA.—The Brown-Corley-Ellis Company this week secured the Iowa agency for the Lozier car. The company will move into new quarters within a few weeks.

SAN DIEGO, CAL.—W. A. Chamberlain, formerly with the Firestone Tire & Rubber Company, of Akron, O., is now associated with the Tibbals-Gavin Company of this city.

DES MOINES, IA.—Secretary of State W. C. Hayward is now receiving registrations for 1912 auto licenses at the rate of 150 a day. The new numbers must be assigned by January 1.

SAN DIEGO, CAL.—W. Pitt Fessenden, formerly of Los Angeles, has recently taken charge of the William R. Ruess Automobile Company in this city, and will handle the Pope-Hartford car.

PORTLAND, ORE.—C. A. Eastman has resigned as manager of the White Motor Car Company, of Portland. His place will be taken by S. G. Houston, a member of the company's force.

MILWAUKEE, WIS.—Percy C. Avery, a well known inventor and manufacturer of motor car appliances in this city, has been elected treasurer of the Milwaukee Automobile Club to succeed Clarke S. Drake.

SAN DIEGO, CAL.—The Western Motor Car Company has leased a new home and will shortly move to Front and C streets. The Bateman-Buoy Company has secured the local agency for the Flanders and E-M-F cars.

PRAIRIE DU CHIEN, WIS.—Brunton & Foss, operating the Prairie City Garage, have dissolved partnership and the business will be continued by Mr. Foss. Mr. Brunton goes to Beloit, Wis., to engage in the garage business.

DES MOINES, IA.—A branch of the Interstate Auto and Supply Company, of Sioux City, will be opened here this week. George Jamieson will be manager. H. B. Groves, the proprietor, will take charge of the Sioux City business.

SAN DIEGO, CAL.—Charles W. Stream, general sales manager of the automobile department of the International Harvester Company, will make his home here this Winter, assisting P. M. Price in the sale of International auto wagons.

SEATTLE, WASH.—C. W. Dansie, for some time past with the Olympic Motor Car Company of this city, has been promoted to the managership of the firm. The Olympic Motor Car Company, handles the Everitt, Chalmers, Herreshoff and Pope-Hartford cars.

DES MOINES, IA.—The Colby Motor Car Company of Mason City will open a branch in this city within a very short time. Quarters have been secured at 1017 Walnut street. W. H. Shadbourne, sales manager for the Colby company, will be in charge of the local branch.

COLUMBUS, O.—State Registrar of Automobiles, J. A. Shearer, has made his report for the quarter ending November 15, as follows: Number of owners registering cars, 2,907; number of chauffeurs securing licenses, 589; manufacturers and dealers registering, 51; duplicate tags furnished, 153. The total receipts for the quarter was $16,976.40. Up to November 15 the department had issued 45,711 sets of number plates.

INDIANAPOLIS, IND.—After trying one line less than one month, the Rapid Motor Transit Company of this city is seriously considering the question of installing additional motor-bus lines. The present line is on North Meridian street. The new lines contemplated are in Broadway, from Massachusetts avenue to Fall Creek, and a cross town line about 7 miles long, running across the north side of the city from Brightwood to Riverside Park.

INDIANAPOLIS, IND.—Will H. Brown, president of the Mais Motor Truck Company, has been made chairman of a committee of the Indianapolis Trade Association to arrange a trade extension trip through southern States for the month of February. A special train, carrying Indianapolis and Indiana manufacturers, jobbers and wholesalers, will visit Louisville, Nashville, Atlanta, Macon, Birmingham, Jacksonville, Albany, Savannah, Montgomery, Mobile, Meridian, Jackson and Memphis.

COLUMBUS, O.—Asserting that Frank Meville, of Bellefontaine, O., doing business as the Standard Automobile Company, had filed in the probate court of Logan county, O., a petition of assignment and had previously given mortgages to prefer two creditors, the King Top Manufacturing Company, of Dayton, the E. L. Essly Machinery Company, of Chicago, and the Hamilton Bros. Company, of Bellefontaine, have filed a petition in the United States court under the bankruptcy act asking that an investigation and a fair distribution of the assets be made.

NEW YORK CITY—One hundred and twenty-five members of the West Side Y. M. C. A. automobile class visited the Maxwell and Columbia salesrooms in Sixty-first street near Broadway recently to inspect the 1912 models, the Maxwell cars that won the Glidden Tour and the latest Columbia cars equipped with the Knight sliding-sleeve motor. After inspecting these, the party entered automobiles at the door and rode to the factories of the Maxwell-Briscoe Motor Company at Tarrytown and Kingsland Point, where they saw the process of building automobiles from the entry of raw material to the shipping of the finished product.

COLUMBUS, O.—D. W. Short, 14 East Swan street, has taken the central Ohio agency for the 1912 Metz.

COLUMBUS, O.—J. B. Hoover, 621 North Fourth street, has taken the 1912 agency for the Nyborg 35. His territory covers central Ohio.

BOSTON, MASS.—The Haynes car is now represented in Boston by the W. L. Russell Company. This company also has the Regal agency.

FREMONT, O.—E. E. Pease has been placed in charge of a new concern which will open a factory for the manufacture of automobile tops. It will be located on North Arch street.

INDIANAPOLIS, IND.—The Merchants Auto Company, recently organized here, has located in North Delaware street. The company has taken the Indiana agency for the Woods electric.

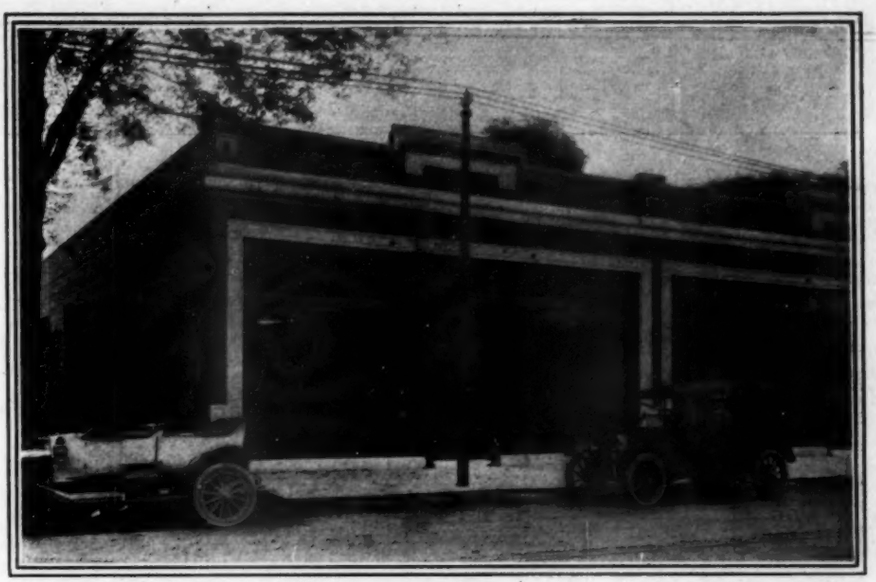
INDIANAPOLIS, IND.—At a recent meeting the local board of public safety decided to ask for an appropriation of $4,500, which will be used to buy a new emergency seven-passenger touring car for the police department.

SANDUSKY, O.—The capital stock of the Sandusky Auto Parts & Motor Truck Company of this city, has been increased from $15,000 to $500,000. A. F. Knotts is president and R. D. Mitchell secretary of the corporation.

COLUMBUS, O.—The United States Carriage Company, of Columbus O., which makes a specialty of automobile hearses and funeral cars, has evolved a motor hearse which is entirely different from any thing now in use.

COLUMBUS, O.—A shipment of 10,000 sets of number plates for 1912, for the Ohio State Automobile Department, has been made by the Scioto Sign Company, of Kenton, O., which firm supplies the tags for the coming year. The 1912 tags will be on a white background with letters in green. The usual style of the number in large figures and the name "Ohio" and the year "1912" at the end of the tag will be followed.

DETROIT, MICH.—The local branch of the Bosch Magneto Company, of New York, is now located in its new quarters at 1250-1252 Woodward avenue close to the corner of Henry street. The building has recently been completed, and is so arranged that the business of the company can be easily handled. Not only has the space been greatly increased over that occupied in the old building, but the staff of mechanics and ignition experts is now doubled, thus the branch is in a position to make repairs or installations on cars at a moment's notice. The offices are located at the front of the building, and back of the salesrooms is a large laboratory and repair shop. Still farther to the rear is a spacious garage.



New quarters of the Detroit branch of the Bosch Magneto Company

Automobile Incorporations

AUTOMOBILES AND PARTS

ASHEBORO, N. C.—Asheboro Motor Car Co.; capital, $5,000; to sell motor cars. Incorporators: M. L. Davis, C. Rush, I. N. Cox.

BLOOMFIELD, N. J.—Torbensen Gear & Axle Co.; capital, $120,000; to make gears and axles. Incorporators: Joseph O. Eaton, Henning O. Trube.

CAMDEN, N. J.—Suburban Truck Co.; capital, $10,000; to make automobiles. Incorporators: J. Ed. Fagan, Geo. H. Jacobs, Walter R. Carroll.

CHICAGO, ILL.—Federal Motor Car Co.; capital, $10,000; to make and sell automobiles. Incorporators: Carey W. Rhodes, David S. Rosenthal, Leo S. Kositchek.

CHICAGO, ILL.—Harder Autotruck Co.; capital, $100,000; to build commercial vehicles. Incorporators: Henry P. Chandler, J. M. Johnson, K. Cornwall.

CHICAGO, ILL.—Stevens Motor Truck Co.; capital, $10,000; to manufacture commercial automobiles. Incorporators: Geo. P. Stevens, Louis F. Stevens, Agnes M. Stevens.

COLUMBIA, S. C.—Consolidated Auto Co.; capital, $5,000; to sell automobiles. Incorporators: J. B. Roddey, W. W. Pearce, J. P. Matthews, John J. Cain.

DETROIT, MICH.—Detroit Bi-Kar Co.; capital, $10,000; to make automobiles. Incorporators: A. Roseroot, J. J. Berkery, J. J. Crain.

GREENSBORO, N. C.—Greensboro Motor Car Co.; capital, $25,000; to make and sell automobiles. Incorporators: H. M. Chamblee, W. M. Fowler, W. J. Sherrod.

KIEL, WIS.—Motor Car Co.; capital, $10,000; to sell automobiles. Incorporators: Frederick Thissen, Philip Jugenheimer, Wm. A. Duecker.

LINCOLN, NEB.—Hitchcock Motor Co.; capital, $24,000; to sell automobiles. Incorporators: A. F. Hitchcock, R. E. Hitchcock, C. F. Allen, W. E. Plumer.

LOUISVILLE, KY.—Transit Motor Car Co.; capital, $20,000; to manufacture freight automobiles. Incorporators: E. C. Walker, Geo. H. Laib, W. B. Young.

MOUNT VERNON, N. Y.—Meteor Automobile Co.; capital, $50,000; to make engines and automobiles. Incorporators: F. A. Kateley, A. F. Gescheidt, J. Emmeluth.

NEW YORK CITY—Delisser Automobile Selling Co. of New York; capital, $10,000; to manufacture and deal in automobiles and supplies. Incorporators: Oliver P. Carpenter, Albert D. Bean, Geo. A. Williams.

NEW YORK CITY—International Horse & Motor Exchange; capital, $75,000; to sell horses, carriages and automobiles. Incorporators: Wm. S. Blitz, C. Jason Water, L. M. Qualey.

NORWALK, CONN.—Reynolds Motor Car Co.; capital, $4,000; to sell automobiles. Incorporators: Frank Reynolds, William L. Oken.

NEW HAVEN, CONN.—Pyramid Automobile Co.; capital, $5,000; to deal in motor cars. Incorporators: Walter H. Goodrich, Henry P. Johnson.

PITTSBURGH, PA.—Krupp Motors Co.; capital, $250,000; to make automobiles. Incorporators: D. Morgan, G. H. Anderson, James McMorran.

PLAQUEMINE, LA.—Plaquemine Motor Car Co.; capital, $10,000; to sell motor cars. Incorporators: W. A. Halloway, Henry Nadler, E. B. Schwing.

GRAND RAPIDS, MICH.—Michigan Auto Joint Co.; capital, $10,000; to make universal joints and automobile accessories. Incorporators: C. E. Perkins, F. Carter.

SHREVEPORT, LA.—F. W. Palis Automobile Co.; capital, $10,000; to sell motor cars. Incorporators: F. W. Palis, W. T. Moore, R. E. Allison.

SOUTHAMPTON, N. Y.—Walter Motor Truck Co.; capital, $100,000; to manufacture and repair automobiles. Incorporators: W. Walter, E. L. Walter, C. W. Fletcher.

WORCESTER, MASS.—Acme Motor Car Co.; capital, $40,000; to manufacture automobiles. Incorporators: William Vincent, Ernest D. Wheeler, Albert D. Watson.

AUTOMOBILE GARAGES AND ACCESSORIES

CHICAGO, ILL.—Advance Motor Specialties Co.; capital, $10,000; to manufacture motor accessories and supplies. Incorporators: Geo. Heldman, Norman A. Street, L. E. Street.

CHICAGO, ILL.—Empire Auto Top & Supply Co.; capital, $20,000; to make automobile tops. Incorporators: Henry Graff, Jr., Albert N. Charles, Joel E. Bullard.

CHICAGO, ILL.—National Tire Spring Co.; capital, $125,000; to manufacture accessories. Incorporators: S. L. Sigman, L. Valence, C. H. Jackson.

CINCINNATI, OHIO—Spring Hub Automobile Wheel Co.; capital, $10,000; to manufacture automobile wheels. Incorporator: Edgar N. Wooley.

COLUMBUS, OHIO—Dunlap Manufacturing Co.; capital, $50,000; to make tools and automobile parts. Incorporators: S. H. Dunlap, T. S. Dunlap, L. F. Sater, E. C. Watson, A. I. Schetenstein.

GASTONIA, VA.—Gastonia Garage Co.; capital, $50,000; to conduct a garage business and automobile agency. Incorporators: A. G. Myers, John C. Rankin.

MISHAWAKA, IND.—Star Garage Association; capital, $5,000. Incorporators: Guy Stutzman, Louis Slick, Marion Pancake, Charles Fenner, Clara Stock-Barger.

NEWARK, N. J.—Suspended Pneumatic Tire Co.; capital, $500,000. Incorporators: Chas. H. Stewart, Albert P. Stewart.

NEW YORK CITY—D. S. L. Co.; capital, $60,000; to operate automobile garages. Incorporators: J. C. Leuse, J. J. Caine, J. P. Dubois.

NEW YORK CITY—Trautman Air Rubber Tube Co.; capital, $100,000; to manufacture automobile tires. Incorporators: Ira Trautman, August V. Denis, Wm. G. Newhall.

NORFOLK, VA.—Virginia Automobile Garage & Repair Corporation; capital, $10,000; to conduct a garage business. Incorporators: H. L. Page, A. M. Bopp, P. A. Page.

PHILADELPHIA, PA.—Motor Spring Co.; capital, $1,000,000; to manufacture and deal in self-starting devices. Incorporators: Leonard E. Wales, L. E. Replogle, Lew W. Cooper.

RICHMOND, VA.—Broad Street Garage; capital, $5,000; to conduct a garage. Incorporators: A. Zachary, O. B. White, C. Stokes.

ST. LOUIS, MO.—Curtis Jack & Truck Co.; capital, $75,000; to make a combination jack and hand truck for automobiles. Incorporators: J. R. Curtis, H. C. Flunker, A. W. Smith, Otto Stifel, George E. Booth.

ST. LOUIS, MO.—Schelph-Budke Tire & Rubber Co.; capital, $10,000; to manufacture automobile tires. Incorporators: Geo. H. Schelph, C. Milton Schelph, Conrad Badke, Jr.

OF INTEREST to the INDUSTRY

New storage battery department of the Apple Electric Company at Dayton, O.

DAYTON, OHIO—The Apple Electric Company, of this city, has added a new battery department to its plant. The new department is fully equipped for the work of turning out storage batteries in large quantities. The company makes a specialty of electric lighting systems for automobiles, motor boats and country homes.

NASHVILLE, TENN.—The Tennessee Auto Company is erecting a $4,500 building.

ALEXANDRIA, VA.—The B. F. Board Motor Truck Company is planning to erect an additional building.

BUTLER, PA.—New machinery is being purchased to add to the equipment of the Butler Vulcanizing Company.

RICHMOND, VA.—Ground has been broken for an automobile factory which the Kline Motor Car Company is to erect in this city at a cost of $300,000.

BUFFALO, N. Y.—The Niagara Gasoline Motor Company of this city is building a one-story brick addition to its plant at Breckenbridge and Barton streets.

WILKES-BARRE, PA.—G. S. Delaney has entered the employ of the Matheson Automobile Company as factory manager and has assumed his duties at the local plant.

LANSING, MICH.—The Hildreth Manufacturing Company has increased its capital stock from $75,000 to $112,500. The company makes gasoline motors and pumps.

ELMIRA, N. Y.—The Morrow Manufacturing Company, of this city, manufacturer of automobile parts, is adding a large amount of new machinery to the equipment of its plant.

LOUISVILLE, KY.—The Continental Car and Equipment Company, of this city, has developed a 3 1-2-ton truck which it will manufacture either here or in New York. McKinley Boyle is president of the company.

MONROE, WIS.—Fred Herrmann, formerly assistant foreman of the testing laboratories of the Thomas B. Jeffery Company, in this city, is now associated with Richard Patterson in the management of the Monroe Automobile Company.

PONTIAC, MICH.—Don McCord, formerly sales manager of the Marion plant, has been appointed general manager of the Flanders Electric factory in this city. Mr. McCord has been sales manager of this firm for several weeks.

DETROIT, MICH.—The Timken Roller Bearing Company and the Timken-Detroit Axle Company have established an advertising department. Edwin A. Walton, formerly assistant advertising manager of the Burroughs Adding Machine Company, is manager.

DETROIT, MICH.—Architects Albert Kahn and Ernest Wilby have awarded the A. J Smith Construction Company the general contract for the new testing shed of the Hudson Motor Car Company at 2901 Jefferson avenue. The shed is to be a two-story brick building, 50 by 500 feet.

NASHVILLE, TENN.—The Marathon Motor Works of this city has increased its capital stock to $1,000,000 and has purchased the plant of the Carbon & Oil Company adjoining its present plant. New equipment, to cost about $225,000, will be installed and the product of the works will be increased to 3,500 cars a year.

DETROIT, MICH.—Through the merging of the sales organizations of the Rapid and the Reliance divisions of the General Motors Truck Company, L. J. Fasquelle is now general sales manager of the company. T. P. Myers is in charge of the company's service department.

BUDAPEST, HUNGARY—American automobile manufacturers are neglecting a fertile European field in this country. The American automobile is practically unknown here in spite of the general prosperity of the 20,000,000 inhabitants and most of the machines in use are of French make.

NEW YORK CITY—American automobile manufacturers appear to be finding a better market in other parts of the world than in Europe, for during the first eight months of this year, the exports of American cars to South America exceeded in value those to France, Germany or Italy, and the exports to British Oceania were not far behind those to the United Kingdom.

NEW YORK CITY—Henry C. McComb, chief engineer for the E. R. Thomas Motor Company before its reorganization, recently resigned as assistant general manager of the Louis J. Bergdoll Motor Company. He has joined the forces of Wyckoff, Church & Partridge, Inc., of Fifty-sixth street and Broadway, this city, as manager of the commercial engineering department.

LOS ANGELES, CAL.—The Moro is the name given to the new car produced by J. B. Morrow, of Morrow, Loomis & Co., a local automobile firm, and James R. Fouche. A large building has been leased and it is expected that by January 1 all necessary equipment will be in place and the manufacture of a number of cars begun.

LOUISVILLE, KY.—The Kentucky Wagon Manufacturing Company has succeeded to the business of the Electric Vehicle Company, by the purchase of the designs, drawings, patterns and equipment of the latter company, and will build all sizes of electric commercial vehicles. H. Hewitt, who was in charge of the Electric Vehicle Company, has been made general manager of this department.

NEW YORK CITY.—Mr. W. Walter, who has been manufacturing commercial cars at 49-51 West Sixty-sixth street in this city, has incorporated the Walter Truck Company to take over the business. The new company will manufacture the same models on a larger scale. A factory and garage will be erected in the neighborhood of Broome street. Mr. Walter is president of the company and will give his attention to the making of trucks. Mr. Fletcher, the secretary and treasurer, will look after the selling end of the business.

PATENTS GONE TO ISSUE

CLUTCH.—Friction device of the expanding band type.

3. This clutch (Fig. 1) consists of a driving and a driven member, one of the members being in form of a shaft and the other in that of a pulley. To the shaft a clutch disc is fixed, and an expansion ring is adapted to engage the inner surface of the pulley. An expansion ring is provided which may be made to engage the inner surface of the pulley, while an expansion lever pivoted to the disc engages one end of the ring. Means are provided to actuate this lever, and a movable device carried by the disc and acted on by the other end of the ring may be operated to apply positive outward pressure to the ring.

No. 1,008,945—to John C. Brewin, Philadelphia, Pa. Granted November 14, 1911; filed December 14, 1910.

AUTOMOBILE SLEIGH—A vehicle for Winter travel in cold countries.

4. This patent relates to a construction (Fig. 2) of a vehicle having a front axle structure carrying vehicle-supporting members, and a vehicle body supporting bearing frames at its rear end. Outer shaft sections are journaled in the bearing frames, and to these sections wheels are fixed. A vertical arch frame is mounted on the bearing frames and has journal boxes vertically reciprocable in opposite sides of it.

In the journal boxes an intermediate shaft section is journaled, and coupling mechanisms intervene between the ends of the intermediate shaft and the adjacent ends of the outer shaft sections, whereby the latter may be connected or disconnected. On the intermediate shaft section a spur propulsion wheel is mounted, which drives the mechanism of the vehicle.

No. 1,008,409—to Alexander Finkelstein, Chicago, Ill. Granted November 14, 1911; filed March 27, 1911.

STEERING AND DRIVING MECHANISM.—A combination of these two functions in one device.

1. This patent refers to a combination (Fig. 3) with a cross member of brackets depending at each end of that cross member, oil casings supported by the brackets between themselves and the cross member, and shafts which are journaled in the casings mentioned. To the shafts wheels are secured, and they also carry, within the casings, bevel gears, which in turn mesh with bevel gears. On the cross member oil casings are mounted, in which a driving gear is located, which serves to drive the second-mentioned bevel gears. Means are provided to operate the driving mechanism. Lugs on the first-mentioned rotatable oil casings extend in opposite directions therefrom, and parallel steering rods connect the lugs so that the first-mentioned oil casings may be rotated to steer the wheels mentioned.

No. 1,008,376—to Samuel E. Siders, Delphos, Kan., and George A. Siders, Novinger, Mo. Granted November 14, 1911; filed October 26, 1909.

MACHINE FOR MAKING RUBBER SHEETS.—Apparatus designed for converting latex into crude rubber.

This machine contains a rotatable metallic drum with enclosed ends and means for uniformly applying heat to the drum periphery, from the interior thereof. A vat containing latex delivers it intermittently to the drum periphery, and means are provided to remove the vat from the drum after every application of latex, and to elevate it again to apply another coat of the material after the preceding coat has been dried by the hot drum.

No. 1,008,607—to Frank E. Mellinger and Henry H. Markley, Lumija, Mexico. Granted November 14, 1911; filed January 19, 1911.

SPARK PLUG.—In which a special design of support for the insulation is used.

3. The plug (Fig. 4) has an insulation mass with an enlarged portion surrounded by gaskets enclosed by a soft metal band. This band has an enlarged middle portion lying between the gaskets to stiffen the band and space the gaskets.

No. 1,008,485—to Charles A. Mezger, New York, N. Y. Granted November 14, 1911; filed November 23, 1908.

BRAKE CONNECTIONS.—Means for applying the brakes to a vehicle wheel.

2. The device is of the friction class and combines an axle with a friction member on it and rotates with it, and an opposed friction member which has an annular groove. A frictional surface is composed of an annular series of radial independent sections, which are interposed between the friction members and loosely confined when the brakes are released.

No. 1,008,792—to John H. Davis, Brooklyn, N. Y., assignor to Momentum Automatic Brake Company, New York, N. Y. Granted Nov. 14, 1911; filed July 24, 1909.

FRICTION DEVICE—Shock absorber in which two inversely positioned series of wedges take up thrust transmitted to device.

2. The patent refers to a device composed of a wall against which a series of wedge members have their bases resting, and on which they are laterally movable, the wedges being partially intermeshed with a series of inverse wedge members which are endwise movable. The base end of the latter wedges project beyond the apices of the first-mentioned series, and a cam having a waved surface acting upon the projecting bases of the second-mentioned series of wedges moves in a path substantially parallel to the wall.

No. 1,008,635—to Phelps M. Freer, Barberton, Ohio. Granted November 24, 1911; filed February 5, 1910.

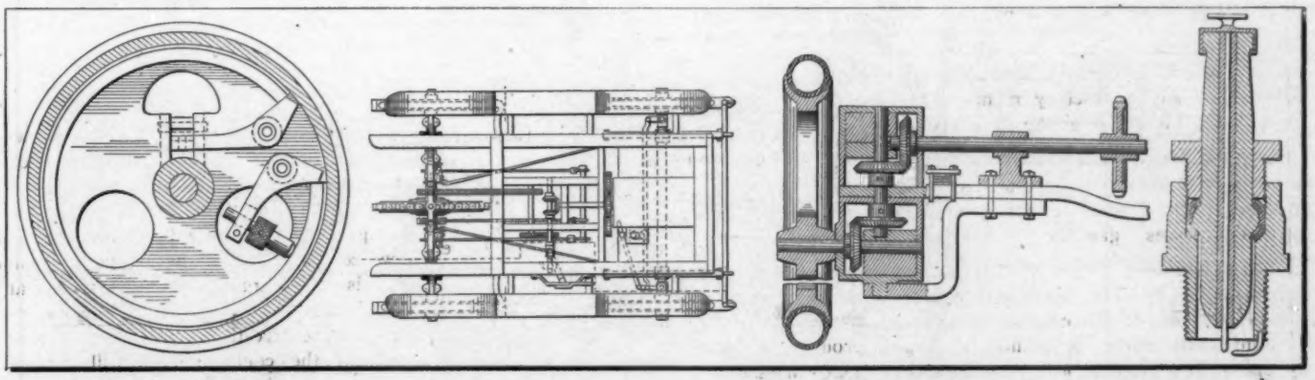


Fig. 1—Brewin friction clutch. Fig. 2—Finkelstein sleigh. Fig. 3—Siders steering and driving mechanism. Fig. 4—Mezger spark plug

Newest Ideas Among the Accessories

Automatic Lock Switch

THE Automatic Lock Switch, which is illustrated in Fig. 1, is made the idea of preventing the starting of an automobile by an outsider who has no business to do this. It consists of a Yale lock, which is placed over the face of the coil box on the dashboard in place of the ordinary switch. Turning the key to the right or left, as the case may be, brings the switchbar into contact with the battery or magneto points, depending on whether the former or latter kind of circuit is used. It is impossible to withdraw the key, except when the current is broken or on neutral; nor can a short-circuit be caused through the use of the key, since the current must go through the coil in order to be effective. But it cannot pass through the coil unles the switchbar is brought into the right position by the key. The lock is so constructed that the switch-case cannot be removed even after the four screws holding it to the coil box are taken out, except if the key is inserted and in a releasing position. As the lock is of the Yale type and only one key is delivered with each lock there is no chance of a thief starting the car as long as the driver holds on to his key. Of course this type of lock is applicable to any type of ignition system, with only a different arrangement in the installation of the lock. The Automatic Lock Switch is manufactured by the Blackburn Specialty Company, Cleveland, Ohio.

Haco Machine Stand

The Haco motor and machine stand, product of the Hathorn Auto Company, of Mason City, Ia., is made with the object of insuring accessibility in repair work done on automobile engines or transmissions. The stand consists of two upright pressed-steel members, as may be seen from Figs. 2 to 4. A shaft which carries a large wheel at one end is laid across the stand

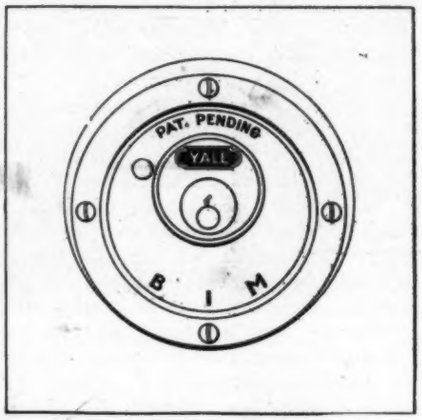


Fig. 1—Automatic lock switch

proper being rigidly fixed at the points of contact with same. A horizontal frame, or rather a working table consisting of several bars, is so connected with the cross-shaft that, if the latter is turned, the working table is moved to an upwardly inclined position, while normally it rests on the two vertical stand members. The cross-shaft may be turned by means of the worm engaging the wormwheel, the worm being forged integrally with a shaft provided with a handle. As Fig. 2 shows, the working table may be brought to any position within 180 degrees, and provision is made for holding it there by locking the wheel. In Fig. 4 the extreme opposite from the position of Fig. 3 is seen so that if the upper half of the engine is up in Fig. 3, access may be had to the lower side of the crankchamber if the working table is titlted to the position shown in Fig. 4. Naturally, the field of this stand is not limited to the work done on engines or transmissions, but may be used as well on most other machine shop jobs.

Slikup Rubber Compound

Slikup, which comes in tins of varying size, is a compound prepared to protect and beautify rubber, especially the running treads of the tires. It is made white and gray, and is applied to the tires by means of a brush, like paint, from which it differs, however, in its composition. When applied to the rubber surface it fills any air holes existing therein and is very effective in preventing sand blisters; at the same time it protects the rubber from the effects of sunlight. Each time the tire is washed a little of the coat is removed, and after some time a new coat must be applied.

Before applying Slikup to the tread, it is thoroughly washed with water to clean all dust, dirt and oil from it. The contents of the can before being brushed on the tread is stirred until it reaches the consistency of a thick cream. Then a flat varnish brush is dipped into it and the stuff is applied to the tire surface. It takes about 45 minutes to dry. The can should always be kept closed so as to keep foreign matter out of it and to keep the solution at the proper concentration, and nothing should be added to the Slikup under any circumstances. If stirring does not bring about the desired change in Winter time it may become necessary to place the tin into a hot-water bath; then the can should of course be closed. Slikup is manufactured by N. B. Arnold, 98 Montague street, Brooklyn, N. Y.

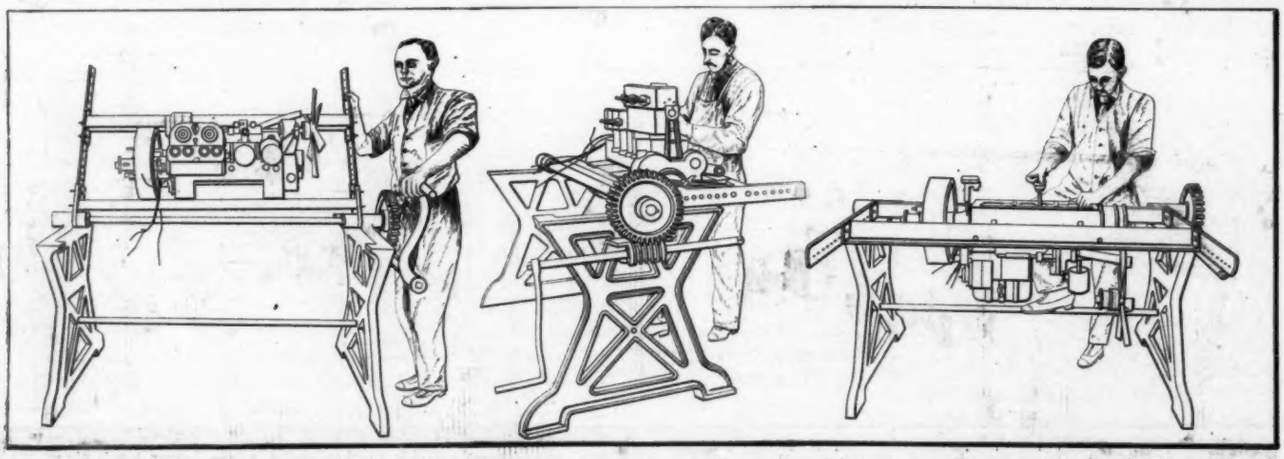


Fig. 2—Lifting the motor by the Haco stand. Fig. 3—Motor in upright position on the Haco. Fig. 4—Getting at the bottom of the crankcase